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1 Methods

The Federal Highway Administration (FHWA) and the Virginia Department of Transportation (VDOT) are preparing a *Tier 1 Draft Environmental Impact Statement (EIS) for the I-81 Corridor Improvement Study in Virginia*. The Draft EIS, being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), evaluates and addresses the potential effects associated with conceptual-level improvements along the entire 325-mile Interstate 81 (I-81) corridor in Virginia. The potential effects of specific improvements along I-81 would be analyzed in greater detail during subsequent Tier 2 NEPA document investigations, if a "Build" concept is advanced.

An Appendix to the Tier 1 Draft EIS, this *Toll Diversion Impact Study* provides detailed information on the toll diversion analysis conducted for the *I-81 Corridor Improvement Study*. Information in this report is summarized in the Tier 1 Draft EIS, as well as in the *Freight Forecast and Diversion Technical Report* and the *Transportation Technical Report*, as appropriate.

The primary focus of the toll diversion impact analysis completed for the *I-81 Corridor Improvement Study* was to determine the diversions expected if tolls were implemented along with the improvements and to assess the potential traffic impacts to other roadways from diverted traffic as a result of this toll diversion from I-81. This chapter describes the methods used for this analysis.

1.1 Concept Development and Analysis Process

Toll diversion modeling was conducted on the concepts developed for the *I-81 Corridor Study Tier 1 DEIS*. The modeling forecasted the effect of tolls with regard to the potential for vehicles to divert from I-81. Five toll scenarios were analyzed: No Toll, Low Toll, High Toll, Low Toll for commercial vehicles only and High Toll for commercial vehicles only. This technical report presents only the traffic volume diversions to and from I-81 based on an improved facility. Cross-section implications and operational analyses related to these

diversions are presented in Chapter 5 of the *Transportation Technical Report*. The following section describes the methods used for the toll diversion modeling and analysis.

It is important to note that with no toll, an improved I-81 would attract vehicles from parallel local and regional roadways. Therefore, 2035 volumes on these parallel roadways would be less than projected 2035 volumes if no improvements were made to I-81 due to an improved I-81. Traffic diversions due to tolls were removed from the traffic volume networks that include increased traffic demand on I-81 due to an improved I-81. For example – a 15 percent increase in traffic volume on I-81 (with no toll implemented) and a 10 percent reduction due to toll diversion would result in a worse level of service on I-81 when compared to 2035 No-Build.

1.2 Toll Diversion Modeling

A computer model was developed to investigate how each of the toll scenarios would affect traffic on I-81 and the surrounding local roads. The potential for traffic diversions from I-81 as a result of tolls were calculated using the assignment step of the travel demand process using the TP+ software program. To determine the potential impacts, traffic volumes were projected, with and without tolls on I-81, onto the National Highway Planning Network (NHPN). The methods for computer modeling are summarized below.

1.2.1 Development of a Model Network (NHPN Base Network)

The basis of the corridor network built for the *I-81 Corridor Improvement Study* was the NHPN. This is a national database maintained by the Federal Highway Administration. It consists of all major highways including interstates, principal arterials, and rural minor arterials. The database contains pertinent roadway information such as distance between intersections, lanes, and functional classification. This data is used as input into the travel demand assignment process.

To supplement the NHPN, it was necessary to add detail to the model network to account for other rural roads in the study area that provide access to I-81 and connectivity to the surrounding areas. These roads were coded in the network using county and state mapping. Lanes and functional classification were assumed for these roadway links. Generally, all minor roads were assumed to be two-lane, minor or major collectors to appropriately account for the rural character of the surrounding study area. The distances coded were scaled off of available county mapping.

1.2.2 Traffic Analysis Zone Structure

The traffic analysis zones (TAZ's) that were developed were based on the land use zones defined by VDOT. TAZ's are typically bounded by roadways, county boundaries, or physical

barriers (rivers, streams, mountains, etc.). For this study, the Virginia TAZ boundaries (developed as part of the statewide modeling effort) were maintained for consistency, but renumbered sequentially for ease of record keeping and analysis. Centroid connectors were added to the highway network to connect the roads to each TAZ.

Due to the extent of the highway network in the northwest portion of the I-81 study area, it was necessary to include a small part of West Virginia in the internal (to Virginia) study network. Specifically, three counties – Hampshire, Hardy, and Pendleton – were included as individual TAZ's in the model and the appropriate roadways in each were included in the study network.

The combination of all these zones formed the basis for loading internal trips to and from the corridor network. In addition to the internal zones, external stations were added at each highway entry link to the network. The external stations form the basis for loading external trips to and from the corridor network. The total number of internal zones is 589 and there are 47 external stations. Table 1-1 summarizes the TAZ structure and numbering scheme.

Table 1-1 Summary of Traffic Analysis Zone Structure

	TAZ Numbers	Total Number of Zones
Corridor Internal Zones	1-362	362
Roanoke Internal Zones	363-586	224
West Virginia Internal Zones	587-589	3
Total Internal Zones	1-589	589
External Stations	590-636	47

1.2.3 Base Year (2004) Trip Table Development

Deriving the base year trip table for the I-81 study area included a three-step process:

1) Collecting recent year traffic volume data;
2) Estimating trip production and trip attraction data at the TAZ level;
3) Running a matrix estimation software program to develop the final trip table.

These steps, as well as model calibration, are further discussed below.

Traffic Volume Data

Current or recent year (2003 –2004) traffic volume data was compiled from two different sources. First, traffic counts were specifically collected for this study on the I-81 ramps along the entire length of the corridor. The remaining traffic counts, including I-81 mainline counts

and external station counts, were obtained from VDOT's *Average Daily Traffic Volumes with Vehicle Classification Data, on Interstate, Arterial and Primary Routes*[1] report. The most recent year available from this report is 2003, so a nominal background growth rate of 3.3 percent per year was applied to these counts to bring them up to an estimated 2004 volume to match the ramp counts that were collected. (See the *Transportation Technical Report* for details.)

Trip Production and Attraction Data

The data used as the basis for trip-end calculation for internal zone trips are the Year 2000 Virginia Statewide land-use data. These data includes information about population, employment, and number of households within each TAZ. An average trip rate was applied to the household data for each TAZ in the study area to determine trip productions of that zone. Similarly, a trip rate was applied to the employment data in each zone to determine trip attractions. These values come from information available from the FHWA and Census Journey-to-Work data.

- Trip Generation Trip Rates:
  - Trip Productions – (Urban): 8.07 trips per household
  - Trip Productions – (Rural): 7.11 trips per household
  - Trip Attractions – (Urban): 1.7 trips per job
  - Trip Attractions – (Rural): 1.5 trips per job

Trip Table Estimation

A software program called Cube ME (Matrix Estimator) was used to develop the base year trip table. This program uses a mathematical approach in combination with travel demand model assignment procedures to estimate an origin-destination matrix. The matrix estimation stage requires the user to input the prepared files – traffic count data and trip productions/attractions – into Cube ME. The program then performs a set of iterative calculations which automatically determines the most likely output matrix for the set of input data values provided. This output matrix then becomes the basis for assignment in the model calibration process as well as the seed for developing the future year trip table.

Model Calibration

The base year trip table was assigned to the corridor network using an equilibrium assignment process. An equilibrium assignment is a method of travel demand modeling by which link volumes are computed on a highway network through a series of iterative assignments based on minimum travel times. The goal of an equilibrium assignment is to assign vehicles to highway links in such a way that no traveler can reduce his or her travel

1 Average Traffic Volume and Classification Data for Interstate, Primary, and Arterial Routes, Virginia Department of Transportation, 1978 – 2003.

time by switching to an alternative route – thus the network is said to have reached 'equilibrium'.

The results of this assignment were checked by comparing the volumes predicted by the model to the field-observed traffic counts on the roadway facilities. Based on this comparison, adjustments were made to the speeds and capacities of the roadway network in the model so that the assignment process produced reasonable volume-to-count ratios.

Free Flow Capacity and Speed

For each of the roadway links in the network, an initial capacity and speed was assigned. The final speeds and capacities, shown in Tables 1-2 and 1-3, were adjusted during the model calibration process in order to match the field-observed volume flows with traffic counts on the various facilities throughout the network.

Table 1-2 Hourly Capacities per Lane (LOS E)

	Area Type	
Facility Type	1 - Rural	2 - Urban
1 – Minor Collector	400	300
2 – Major Collector	650	560
3 – Minor Arterial	900	850
4 – Principal Arterial	1,100	1,000
5 – Interstate	2,200	1,900
6 – Ramp	1,500	1,600
7 – Scenic	1,000	1,000
8 – Freeway	2,200	1,900
0 – Centroid Connector[1]	10,000	10,000

1 Centroid connectors represent all local streets in a specific area. Vehicles assigned to the model must be assigned both an origin and destination; therefore, the capacity of a centroid connector must be high enough to always remain unconstrained.

Table 1-3 Free-Flow Speeds (mph)

	Area Type	
Facility Type	1 - Rural	2 - Urban
1 – Minor Collector	45	15
2 – Major Collector	45	17
3 – Minor Arterial	45	21
4 – Principal Arterial	62	32
5 – Interstate	75	60
6 – Ramp	35	35
7 – Scenic	35	35
8 – Freeway	75	60
0 – Centroid Connector	35	25

1.2.4 Future Year Trip Table Development

A series of growth factors were applied to the base-year trip table in order to determine the final future year trip table. Two basic sources were used to derive the growth factors: 2025 Virginia land use/socioeconomic data for internal zone growth factors and the VDOT historical traffic counts for external station growth factors.

The growth rates for internal zones were calculated by comparing the 2000 and 2025 Virginia land use/socioeconomic data. The land use/socioeconomic data was already divided into the same zone structure as the travel demand model, and the 2000 data was used as the basis for calculating zone trips in the base year. Furthermore, in the case of existing high population and employment zones, the growth within these zones was tempered to a reasonable future year value. This reflects the idea that in an urban area, a higher growth is expected in the outlying, undeveloped zones while the existing developed zones experience a much lower growth rate. The resulting annual growth rates within the study area were generally found to be in the range of zero percent to five percent (Roanoke suburban), with an average growth rate of about one percent per year.

The historical traffic counts from 1990 to 2002 were used as the basis for computing a growth rate for the external links that enter the study area. The average annual growth rate for traffic entering the model network ranged from two percent to just over three percent.

The final element that was added to the future year trip table was an estimated truck trip table. This table represents commercial truck trips that traverse to, from, within, and through the I-81 corridor. Since the estimated trip table is for all vehicles, it was necessary to subtract the truck-trip table from the total vehicle table to get a passenger car trip table. These two trip tables become the input into the model assignment process. Information regarding the development of the truck-trip table can be found in the *Freight Forecast and Diversion Technical Report*.

1.2.5 Travel Demand Model Assignment with Toll Diversion

A user equilibrium travel demand assignment was used to get the final estimated traffic volumes in the I-81 study area. Using the passenger car and truck trip tables that were developed, a traffic assignment was run on the network. This assignment was performed for a No-Build traffic volume network as well as for the five toll scenarios used in the "Build" concepts developed for the study. These concepts are described in the *Concept Development Technical Report*. The various toll scenarios tested including:

- No-Build, No Toll
- "Build" No Toll
- "Build" Low Toll
  - $0.08 per passenger car per mile
  - $0.04 per truck axle per mile
- "Build" High Toll
  - $0.14 per passenger car per mile
  - $0.07 per truck axle per mile
- "Build" Low Toll for Commercial Vehicles Only
  - $0.04 per truck axle per mile
- "Build" High Toll for Commercial Vehicles Only
  - $0.07 per truck axle per mile

These rates were chosen because they are representative on current national average rates (see Table 1-4). The comparison between the No-Toll and Toll scenarios provides the diversion numbers for this study.

The process of 'modeling' a toll scenario in a travel demand model was done by converting the toll cost per mile into an equivalent time penalty. This additional perceived time by the toll user was then added to the total travel time on I-81 in order to influence whether or not the user is willing to find a competing route on an alternate toll-free facility that offers a competitive travel time. The primary piece of data required for this conversion is an estimate of the facility user's value of time. The values assumed for this toll assignment are:

- Passenger Car Value of Time: $15 per hour
- Truck Value of Time: $60 per hour

These values are considered acceptable national average values that have been used in other toll diversion studies including the C-470 Toll Diversion Study in Denver, Colorado as well as general studies in the Atlanta region. The inverse of these values results in a time

conversion of four minutes per dollar and 1 minute per dollar for passenger cars and trucks, respectively. This means that for every dollar that a vehicle is tolled; it is the equivalent of adding four minutes of travel time to a passenger car's trip and adding one minute of travel time to a truck trip. Because a commercial trucker's value of time is higher than that of a passenger car, the perceived time penalty of an imposed toll is less for a trucker, and they are therefore less likely to divert from I-81 than a passenger car.

Based on the higher inelasticity of truck traffic in regards to tolls, the scenarios of truck-only tolls were studied. When compared to the tolls charged elsewhere, Table 1-4 shows that the High Truck Toll study rate ($0.07 per mile/per truck axle) is somewhat above the national average, while the Low Truck Toll study rate ($0.04 per mile/per truck axle) is somewhat below the national average. However, both are representative of average current rates charged nationwide.

Table 1-4 National Truck Toll Rates

Toll Agency/Facility	Truck 5-Axle Dollar per Mile	Last Increase
PA of NY & NJ/ George Washington Bridge	$16.67	2001
PA of NY & NJ/ Lincoln Tunnel	$10.07	2001
PA of NY & NJ/ Holland Tunnel	$9.38	2001
Chicago Skyway	$1.08	2005
Transportation Corridor Agencies (California)	$0.83	2003
E-470 Public Highway Authority (Colorado)	$0.73	2003
National Urban Truck Average Rate	$0.38	
North Teas Tollway Authority	$0.37	2002
Miami-Dade Expressway Authority (Florida)	$0.36	2004
I-81 High Truck Toll Study Rate	$0.35	
Illinois Tollway	$0.31	2005
National Truck Average Rate	$0.29	
Florida Turnpike Enterprise	$0.26	2004
Orlando Orange County Expressway Authority (Florida)	$0.24	1990
Pennsylvania Turnpike Commission	$0.23	2004
I-81 Low Truck Toll Study Rate	$0.20	
New Jersey Turnpike	$0.19	2003
Indiana DOT – Toll Road District	$0.09	1985

Source: Illinois State Toll Highway Authority
Rates as of January 1, 2005; Shown in $ 2005

Most economic studies show the trucking industry to be largely *inelastic*, i.e. more likely to pay higher charges and fees when they are imposed rather than to modify behavior in order to avoid those costs. However, while the studies are more anecdotal and not as well quantified, there are also examples of truckers diverting to secondary roads when they feel tolls are unfairly and excessively applied to their industry.

The most recent examples include the Ohio Turnpike, which in an effort to encourage trucks to return to the Turnpike, recently reduced tolls in order to partially roll-back increases that were implemented from 1995 to 1999. Similarly when the Illinois State Highway Authority raised truck tolls by 300 percent on January 1, 2005 the number of trucks using alternate roads jumped by 100 percent in some cases, well above the predicted divergence. This particular situation is still in flux, and would most likely not remain at that level of toll-avoidance.

The point to be taken regarding toll rates is that while there is a maximum revenue that can be obtained through tolls, they must also be set at a level which truckers perceive to be in line

with the benefit gained from paying the toll, e.g. reduced congestion, or at a minimum the toll must not be perceived as an undue or unfair hardship.

1.3 Interpretation of Results

Once traffic was estimated for each scenario from the computer modeling, a method was developed to determine traffic impacts as a result of toll diversion. Three key areas of interest were:

- Diversions to I-81 due to increased corridor capacity;
- Toll diversions from I-81; and,
- The impacts of these diversions on alternate routes.

With respect to the impacts on alternate routes, analysis of both the volume-to-capacity (v/c) ratio and the percent increase in traffic between a "Build" No-Toll base case scenario and the toll scenarios was completed. This combination (projected increases in traffic on alternate routes and a resultant v/c over a certain threshold) should best characterize the relative level of impact. These methods are further described later in this report.

2 Toll Diversion Analysis

This chapter examines the changes in traffic on I-81 and the surrounding local roadways due to widening the existing I-81 and to the addition of tolls. This chapter also defines low, moderate, and high impact to the local roadways and evaluates the potential for this impact. The information provided in this chapter is expressed in terms of no toll, low toll, high toll, low toll for commercial vehicles, and high toll for commercial vehicles. These five toll scenarios were then combined with capacity and rail improvements and used to create the 211 combinations of TSM, road improvements, rail improvements, and various toll scenarios identified in the *Concept Development Technical Report*.

2.1 Diversions to an Expanded I-81 Without Tolls

One of the potential benefits of improving I-81 is removing regional traffic from U.S. Route 11 and other parallel facilities. Throughout the study area, the expanded I-81 would have two to 15 percent more traffic volume than an unimproved I-81. This increased volume represents vehicles shifting their route choice from local roadways to I-81. Generally, in locations with higher populations and traffic volumes, the diversion percentages are greater as traffic shifts from one facility to another due to the additional capacity on I-81. In more rural areas, the effects are smaller as the capacity before the improvements to I-81 may be sufficient to accommodate demand and users would already be using the appropriate facility to complete their trip. This trend can be seen in Table 2-1 and Figure 2-1.

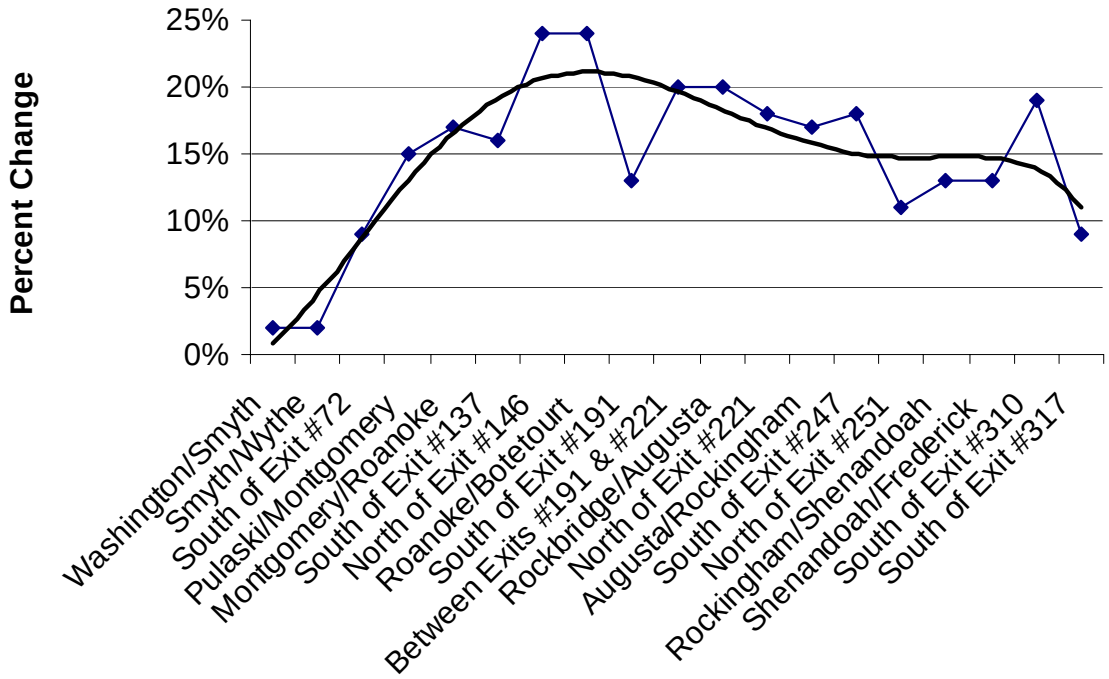
U.S. Route 11 is shown in Table 2-1 as it consistently parallels I-81 and demonstrates this trend. A similar result occurs on Hwy 42, U.S. Route 211, U.S. Route 220 and U.S. Route 340. Model estimates for these roadways are provided in Appendix A to this technical report.

Table 2-1 Changes in Traffic on I-81 and U.S. Route 11 as a Result of Expanded I-81 (No toll)

	I-81	U.S. Route 11
Washington/Smyth	2%	-3%
Smyth/Wythe	2%	-2%
South of Exit #72	9%	-57%
Pulaski/Montgomery	15%	-12%
Montgomery/Roanoke	17%	-27%
South of Exit #137	16%	-11%
North of Exit #146	24%	-34%
Roanoke/Botetourt	24%	-34%
South of Exit #191	13%	-10%
Between Exits #191 & #221	20%	-97%
Rockbridge/Augusta	20%	-97%
North of Exit #221	18%	-63%
Augusta/Rockingham	17%	-37%
South of Exit #247	18%	-10%
North of Exit #251	11%	-34%
Rockingham/Shenandoah	13%	-33%
Shenandoah/Frederick	13%	-48%
South of Exit #310	19%	-17%
Average	15%	-35%

Note: These percentages should only be viewed as reflections of change, not in projected traffic volume, as the modeling was conducted at the macro level and for comparison purposes only. The percentages tend to be higher on the smaller facilities as differences in smaller numbers can be more dramatic when expressed as a percentage.

Figure 2-1 Percent Increase in I-81 Traffic, South to North



2.2 Vehicle Diversions Due to Tolls

The effect of tolls was studied to determine their relative impact to traffic traveling I-81 and the relative impacts to other roads as vehicles divert from I-81 to avoid the toll. As explained previously, five toll scenarios were tested.

U.S. Route 11 closely parallels I-81 throughout Virginia and it is expected that this route would absorb about half of all trips diverting from I-81 due to tolls. Impacts to other roadways (which are discussed below) would be lower than those identified herein. On U.S. Route 11, volume increases vary greatly throughout the corridor. These changes are in direct proportion to the current volume and capacity of the existing roadway. This relationship is discussed in greater detail below.

Table 2-2 Expected Increase in Total Daily Traffic Volumes on U.S. Route 11 Due to Tolls on I-81

Summary of Traffic Increases on U.S. 11	Percent Increase		Volume Increase, Vehicles per Day	
	Low Toll vs. No Toll	High Toll vs. No Toll	Low Toll vs. No Toll	High Toll vs. No Toll
Lowest Increase	0%	3%	-80	660
Highest Increase	266%	1970%	8,000	13,135
Average (All locations)	94%	301%	3,518	6,138

It is important to note that modeling for toll scenarios was done at the macro level and should be used for comparison purposes. The percentages listed tend to be higher on smaller facilities as differences in smaller numbers can be more dramatic when expressed as a percent change. Therefore, it can be concluded that while the percentages may seem high, the actual impact resulting from the number of vehicles is low. The low and high toll averages of approximately 3,500 and 6,100 total vehicle increases (see Table 2-2) are not large increases for a rural principal arterial like U.S. Route 11. For example, assuming a k factor (the percent of daily traffic occurring during the peak hour) of 10 percent (which is a common factor on roadways with characteristics like U.S. Route 11) and an even directional split, the additional traffic to a four-lane U.S. Route 11 would be approximately 152 vehicles per lane per hour for the high toll scenario. Impacts to specific areas of I-81 and U.S. Route 11 are shown in Table 2-3.

Table 2-3 Percent Change in Total Daily Traffic Volumes on I-81 and U.S. Route 11 Due to Tolls

	No Toll vs. Low Toll		No Toll vs. High Toll		No Toll vs. Low Toll for Comm Vehicles		No Toll vs. High Toll for Comm Vehicles	
	I-81	US-11	I-81	US-11	I-81	US-11	I-81	US-11
Washington/Smyth	-13%	79%	-23%	106%	-0.4%	-4%	-8%	47%
Smyth/Wythe	-17%	266%	-32%	419%	-3%	32%	-12%	185%
South of Exit #72	-16%	351%	-32%	618%	-2%	38%	-16%	401%
Pulaski/Montgomery	-9%	9%	-17%	24%	-3%	0.2%	-5%	1%
Montgomery/Roanoke	-5%	6%	-13%	33%	-2%	1%	-4%	11%
South of Exit #137	-4%	0%	-8%	3%	-2%	0.1%	-2%	1%
North of Exit #146	-7%	20%	-11%	27%	-1%	-0.2%	-3%	5%
Roanoke/Botetourt	-7%	20%	-11%	27%	-1%	-0.2%	-3%	5%
South of Exit #191	-6%	5%	-17%	33%	-2%	-0.1%	-4%	4%
Between Exits #191 & #221	-5%	312%	-13%	1970%	-0.4%	0%	-1%	-42%
Rockbridge/Augusta	-5%	312%	-13%	1970%	-0.4%	-100%	-1%	16%
North of Exit #221	-9%	203%	-11%	190%	-1%	-2%	-3%	101%
Augusta/Rockingham	-11%	50%	-14%	56%	-1%	1%	-2%	9%
South of Exit #247	-8%	6%	-12%	7%	-2%	1%	-1%	2%
North of Exit #251	-6%	29%	-9%	45%	-1%	3%	-3%	20%
Rockingham/Shenandoah	-10%	43%	-14%	63%	-4%	25%	-6%	44%
Shenandoah/Frederick	-11%	45%	-19%	91%	-2%	20%	-3%	44%
South of Exit #310	-7%	22%	-16%	29%	-2%	5%	1%	6%
Average (All Locations)	-8%	94%	-15%	301%	-2%	1%	-4%	46%

Note: These percentages should only be viewed as reflections of change, not in projected traffic volume, as the modeling was conducted at the macro level and for comparison purposes only. The percentages tend to be higher on the smaller facilities as differences in smaller numbers can be more dramatic when expressed as a percentage.

2.2.1 Changes in Total Traffic Volume

Although US Route 11 is the best single representative of an impacted roadway, all local roads in the greater I-81 study area would share in absorbing the reduction of I-81 traffic due to tolls. However, nearly one-half of the reduction of I-81 traffic would be absorbed by U.S. Route 11. Table 2-4 shows the changes in total traffic volume by roadway. It should be noted that while the average increase on U.S. Route 11 due to low tolls is 3,630, there is still a net decrease in U.S. Route 11 volume when compared to Build No Toll. Therefore, the traffic volumes on Route 11 can be expected to be below No-Build projections even with the inclusion of a low toll. Under high toll conditions, a slight gain in traffic volume can be expected due to toll diversions along the corridor.

Table 2-4 Model Changes in Total Daily Vehicular Volume on I-81 and U.S. Route 11 Due to Tolls (Compared to Build No Toll)

	Build No Toll			Low Toll[1]			High Toll[1]			Low Toll Commercial Vehicles Only[1]			High Toll Commercial Vehicles Only[1]		
	Gain on I-81	Reduction on U.S. 11	Reduction on other Roads	Reduction on I-81	Gain on U.S. 11	Gain on other Roads	Reduction on I-81	Gain on U.S. 11	Gain on other Roads	Reduction on I-81	Gain on U.S. 11	Gain on other Roads	Reduction on I-81	Gain on U.S. 11	Gain on other Roads
Washington/Smyth	1,540	225	1,315	8,105	5,515	2,590	14,505	7,425	7,080	250	-305	555	5,440	3,295	2,145
Smyth/Wythe	1,050	65	985	10,085	8,000	2,085	19,385	12,605	6,780	1,530	960	570	7,295	5,580	1,715
South of Exit #72	5,610	2,860	2,750	10,435	7,450	2,985	20,830	13,135	7,695	1,415	805	610	10,340	8,525	1,815
Pulaski/Montgomery	11,830	2,090	9,740	8,010	1,410	6,600	15,570	3,835	11,735	2,630	25	2,605	4,305	110	4,195
Montgomery/Roanoke	14,695	6,265	8,430	5,085	1,105	3,980	12,990	5,740	7,250	1,880	210	1,670	4,245	1,945	2,300
South of Exit #137	15,145	2,875	12,270	4,560	-80	4,640	9,070	660	8,410	1,690	-5	1,695	2,660	260	2,400
North of Exit #146	23,475	8,725	14,750	8,320	3,485	4,835	13,165	4,635	8,530	1,745	-40	1,785	3,335	825	2,510
Roanoke/Botetourt	23,475	8,725	14,750	8,320	3,485	4,835	13,165	4,635	8,530	1,745	-40	1,785	3,335	825	2,510
South of Exit #191	10,965	1,840	9,125	6,170	865	5,305	16,475	5,610	10,865	1,945	-20	1,965	3,775	750	3,025
Between Exits #191 & #221	20,240	14,485	5,755	5,755	1,560	4,195	16,175	9,850	6,325	510	0	510	1,120	-210	1,330
Rockbridge/Augusta	20,240	14,485	5,755	5,755	1,560	4,195	16,175	9,850	6,325	510	-500	1,010	1,120	80	1,040
North of Exit #221	18,445	6,375	12,070	10,425	7,665	2,760	13,345	7,165	6,180	1,245	-60	1,305	3,375	3,830	-455
Augusta/Rockingham	15,755	5,825	9,930	11,550	4,890	6,660	14,775	5,460	9,315	4,065	60	4,005	2,240	925	1,315
South of Exit #247	16,900	4,690	12,210	8,675	2,650	6,025	13,790	2,695	11,095	1,965	515	1,450	615	1,010	-395
North of Exit #251	10,570	6,310	4,260	5,970	3,545	2,425	9,295	5,555	3,740	1,135	340	795	3,305	2,455	850
Rockingham/Shenandoah	11,285	6,065	5,220	9,340	5,250	4,090	13,575	7,625	5,950	3,675	3,020	655	5,610	5,370	240
Shenandoah/Frederick	11,905	7,405	4,500	11,385	3,600	7,785	18,945	7,290	11,655	1,710	1,605	105	3,105	3,515	-410
South of Exit #310	17,770	3,105	14,665	7,330	3,395	3,935	17,145	4,465	12,680	2,080	750	1,330	-1,620	990	-2,610
Average (All locations)	13,940	5,690	8,250	8,070	3,630	4,400	14,910	6,570	8,340	1,765	405	1,360	3,535	2,225	1,310

1 The reduction in I-81 traffic and the gain in local traffic are taken from the Build No Toll case. In many cases, even with the "gain" seen on local roadways, traffic volumes are expected to be below No-Build projections.

2.2.2 Changes in Truck Traffic Volumes

The most substantial change in truck volumes is the decrease in local trucks on local roadways as a result of adding lanes on I-81. The concepts with the greatest number of trucks on U.S. Route 11 are the No-Build and "Build" High Toll for Commercial Vehicles concepts. Low Tolls do not change truck volumes substantially as compared with No Tolls on the expanded I-81. Some areas would see increases in truck volumes as a result of High Commercial Vehicle Toll.

Table 2-5 summarizes the effects of tolls on truck traffic volumes. These changes are compared to the No-Build scenario.

Table 2-5 Changes in Daily Truck Traffic Volumes on I-81 and US Route 11 (Compared to No Build)

	No Build vs Build No Toll		No Build vs Low Toll[1]		No Build vs High Toll[1]		No Build vs Low Toll for Commercial Vehicles Only[1]		No Build vs High Toll for Commercial Vehicles Only[1]	
	I-81	U.S. 11	I-81	U.S. 11	I-81	U.S. 11	I-81	U.S. 11	I-81	U.S. 11
Washington/Smyth	420	0	-160	25	-1,875	1,275	-215	35	-5,890	4,180
Smyth/Wythe	415	0	-150	5	-1,865	1,315	-1,065	885	-7,695	5,990
Pulaski/Montgomery	3,910	-5	3,070	-10	1,990	-10	-955	5	-1,235	10
Montgomery/Roanoke	5,260	-1,485	3,815	-1,205	2,670	75	1,765	-1,135	-1,915	1,440
Roanoke/Botetourt	6,865	-1,495	5,650	-1,490	5,890	-1,500	3,510	-1,230	1,165	110
Rockbridge/Augusta	4,690	-3,515	3,985	-3,515	3,410	-3,510	3,820	-3,520	3,515	3,510
Augusta/Rockingham	3,515	-1,595	2,505	-1,575	735	-15	1,475	-1,425	-2,095	1,450
Rockingham/Shenandoah	2,335	-1,495	1,875	-1,625	2,775	-2,240	-5,285	5,000	-8,135	7,385
Shenandoah/Frederick	2,055	-1,985	1,415	-1,435	725	-785	-480	245	-3,390	3,190
Average	3,274	-1,286	2,445	-1,203	1,606	-599	498	-127	-2,853	2,225

1 The reduction in I-81 traffic and the gain in local traffic are taken from the No Build case. In many cases, even with the "gain" seen on local roadways, traffic volumes are expected to be below No-Build projections.

With the exception of a few points, the projected truck diversions are not substantial. This is especially true with the low toll scenarios, where diversions would be very minor given the large number of trucks that use the corridor each day. To further analyze the effects of tolls and diversion, analyses comparing the following effects were completed:

- High Toll vs. Truck Only Low Toll;
- Low Toll vs. Truck Only Low Toll;
- High Toll vs. Truck Only High Toll; and
- Low Toll vs. Truck Only High Toll.

Tables 2-6 and 2-7 show these comparisons and the changes in both total vehicles and total vehicle diversion, as well as the changes in the total number of trucks and total truck diversion.

The analysis in Table 2-6 uses the original analyses of the High and Low Toll scenarios as compared to a High and Low Toll for commercial vehicles only. The rate of the High Toll scenario was $.14 per mile per passenger vehicle and $.07 per axle mile for trucks while the rates of the Low Toll scenario were $.08 per mile per passenger vehicle and $.04 per axle mile for trucks.

With a change in the toll charged from the High Toll scenario to the Low Toll for commercial vehicles the decrease in total vehicle diversion ranged from approximately 75 percent for Highway 42 at the Smyth/Wythe County Line to one percent for U.S. Route 340 at the Augusta/Rockingham County Line. This shift from the High Toll to the Low Toll for commercial vehicles caused a median 13 percent decrease in diversion of total vehicle traffic and a median 3.9 percent increase in the diversions of trucks. This means that the substantial diversion of passenger vehicles under the High Toll scenario was large enough to cause the volume of truck traffic to increase in aggregate, even though the cost per axle mile for trucks increased from $.04 to $.07 (a 75 percent increase). In this case, the model predicts that the congestion delay value (the benefit received by trucks) exceeds the cost of the additional truck tolls. These calculations vary widely between locations as shown in the table.

With the change in the toll charged from the Low Toll Scenario to the Low Toll for commercial vehicles, the model indicates that, again in aggregate, total vehicle diversion decreases 5.8 percent while truck diversions increase by 7.5 percent from the Low Toll scenario. Again, the model demonstrates that the decrease in congestion from passenger vehicles in the Low Toll scenario causes a decrease in truck diversions from the Low Toll for commercial vehicles scenario even though the toll for trucks remains at $.04 per axle mile in both cases.

The model demonstrates the general principle that the elasticity (response) of passenger vehicles to tolls is greater than that of trucks. This is demonstrated in the positive numbers for the median percentage increase in total vehicle diversions and the negative numbers for the median values of the percentage decrease in total truck diversions which are common to both comparative cases.

Table 2-6 Comparative Analysis of Truck Diversion (Low Toll for Commercial Vehicles vs. Low Toll, and Low Toll for Commercial Vehicles vs. High Toll)

		Changes in Total Vehicles				Changes in Total Number of Trucks					
		Percent Change in Total Number of Vehicles		Percent Increase/Decrease in Total Vehicle Diversion		Percent Change in Total Number of Trucks		Percent Increase/Decrease in Total Truck Diversion		Percent Increase/Decrease in v/c Ratio	
County Line	Facility Name	High Toll vs Low Toll Comm	Low Toll vs Low Toll Comm	High Toll vs Low Toll Comm	Low Toll vs Low Toll Comm	High Toll vs Low Toll Comm	Low Toll vs Low Toll Comm	High Toll vs Low Toll Comm	Low Toll vs Low Toll Comm	High Toll vs Low Toll Comm	Low Toll vs Low Toll Comm
Washington/Smyth	I-81	29%	14%	-22%	-12%	10%	0%	-9%	0%	29%	14%
	U.S. Route 11	-54%	-47%			-98%	-36%			-54%	-47%
	Highway 91	-5%	-2%			0%	0%			-5%	-2%
Smyth/Wythe	I-81	44%	17%	-30%	-14%	5%	-5%	-4%	5%	44%	17%
	U.S. Route 11	-75%	-60%			-66%	8750%			-75%	-64%
	Highway 42	-75%	-40%			-100%	0%			-75%	-41%
Wythe/Pulaski	I-81	18%	4%	-15%	-4%	-4%	-8%	4%	8%	18%	4%
	Highway 42	-15%	-4%			-50%	-50%			-15%	-4%
	U.S. Route 221	-11%	-4%			-48%	-40%			-11%	-4%
Pulaski/Montgomery	I-81	17%	6%	-14%	-6%	-4%	-8%	4%	8%	17%	6%
	U.S. Route 11	-19%	-8%			25%	25%			-19%	-8%
Montgomery/Roanoke	I-81	12%	3%	-11%	-3%	-4%	-8%	3%	7%	12%	3%
	U.S. Route 11	-24%	-5%			-89%	-37%			-24%	-5%
	Highway 42	-37%	-21%			-100%	-100%			-37%	-21%
Roanoke/Botetourt	I-81	11%	6%	-10%	-6%	-9%	-8%	8%	8%	11%	6%
	U.S. Route 11	-22%	-17%			1300%	700%			-22%	-17%
Botetourt/Rockbridge	I-81	10%	3%	-9%	-3%	-7%	-8%	7%	8%	10%	3%
	I-64	-12%	-4%			-35%	-37%			-13%	-4%
	U.S. Route 220	-22%	-15%			-43%	-4%			-22%	-15%
Rockbridge/Augusta	I-81	15%	5%	-13%	-4%	1%	-1%	-1%	1%	15%	5%
	U.S. Route 11	-95%	-75%			0%	200%			-95%	-75%
	Highway 42	-22%	-10%			-17%	0%			-22%	-10%
Augusta/Rockingham	I-81	15%	11%	-13%	-10%	3%	-4%	-3%	4%	15%	11%
	U.S. Route 11	-35%	-33%			-94%	117%			-35%	-33%
	Highway 42	-15%	-11%			-33%	-43%			-15%	-11%
Rockingham/Shenandoah	I-81	12%	6%	-10%	-6%	-33%	-30%	33%	29%	12%	6%
	U.S. Route 11	-23%	-13%			175%	99%			-23%	-13%
	U.S. Route 211	16%	17%			-57%	-40%			16%	17%
	U.S. Route 340	-22%	-13%			-13%	-37%			-22%	-13%
Shenandoah/Frederick	I-81	21%	11%	-17%	-10%	-7%	-11%	7%	11%	21%	11%
	U.S. Route 11	-37%	-17%			-22%	20%			-37%	-17%
	Highway 628	-27%	-22%			0%	0%			-27%	-22%

Table 2-7 Comparative Analysis of Truck Diversion (High Toll for Commercial Vehicles vs. Low Toll, and High Toll for Commercial Vehicles vs. High Toll)

		Changes in Total Vehicles				Changes in Total Number of Trucks					
		Percent Change in Total Number of Vehicles		Percent Increase/Decrease in Total Vehicle Diversion		Percent Change in Total Number of Trucks		Percent Increase/Decrease in Total Truck Diversion		Percent Increase/Decrease in v/c Ratio	
County Line	Facility Name	High Toll vs High Toll Comm	Low Toll vs High Toll Comm	High Toll vs High Toll Comm	Low Toll vs High Toll Comm	High Toll vs High Toll Comm	Low Toll vs High Toll Comm	High Toll vs High Toll Comm	Low Toll vs High Toll Comm	High Toll vs High Toll Comm	Low Toll vs High Toll Comm
	I-81	18%	5%	-14%	-4%	24%	-31%	21%	30%	18%	5%
Washington/Smyth	U.S. Route 11	-29%	-18%			226%	11871%			-44%	-18%
	Highway 91	-4%	-2%			0%	0%			-67%	-2%
	I-81	30%	6%	-20%	-5%	-34%	-40%	30%	39%	44%	6%
Smyth/Wythe	U.S. Route 11	-45%	-22%			356%	119700%			-49%	-22%
	Highway 42	-75%	-40%			-97%	0%			272%	-41%
	I-81	16%	2%	-13%	-2%	-14%	-18%	13%	17%	1%	2%
Wythe/Pulaski	Highway 42	-15%	-4%			0%	0%			189%	-4%
	U.S. Route 221	-8%	-1%			66%	91%			-38%	-1%
Pulaski/Montgomery	I-81	15%	4%	-12%	-4%	-13%	-17%	12%	16%	3%	4%
	U.S. Route 11	-19%	-7%			200%	200%			-19%	-7%
	I-81	10%	1%	-8%	-1%	-18%	-22%	16%	21%	13%	1%
Montgomery/Roanoke	U.S. Route 11	-16%	5%			88%	945%			-30%	5%
	Highway 42	-27%	-7%			60%	167%			126%	-7%
Roanoke/Botetourt	I-81	9%	4%	-8%	-4%	-17%	-16%	17%	16%	-33%	4%
	U.S. Route 11	-18%	-13%			13900%	6900%			-34%	-13%
	I-81	9%	2%	-8%	-2%	-12%	-14%	12%	13%	-5%	2%
Botetourt/Rockbridge	I-64	-10%	-1%			46%	43%			7%	-1%
	U.S. Route 220	-19%	-12%			35%	129%			24%	-12%
	I-81	14%	4%	-13%	-4%	0%	-2%	0%	2%	-25%	4%
Rockbridge/Augusta	U.S. Route 11	-94%	-72%			0%	100%			-23%	-43%
	Highway 42	-22%	-10%			75%	110%			28%	-10%
	I-81	13%	10%	-12%	-9%	-11%	-17%	10%	17%	-16%	10%
Augusta/Rockingham	U.S. Route 11	-30%	-27%			91%	6722%			-47%	-27%
	Highway 42	-13%	-9%			67%	25%			-54%	-9%
	I-81	9%	4%	-8%	-4%	-44%	-42%	45%	41%	-30%	4%
Rockingham/Shenandoah	U.S. Route 11	-11%	1%			598%	405%			-59%	1%
	U.S. Route 211	18%	19%			0%	33%			2%	19%
	U.S. Route 340	-22%	-14%			90%	37%			-35%	-14%
	I-81	20%	9%	-16%	-8%	-25%	-28%	23%	27%	-3%	9%
Shenandoah/Frederick	U.S. Route 11	-25%	-1%			215%	385%			-48%	-1%
	Highway 628	-24%	-19%			0%	0%			-6%	-19%

2.3 Potential Traffic Impacts on Local Roadways

U.S. Route 11 is expected to absorb about half of all diversions from I-81. Other routes expected to see diversions include:

- Routes 610
- Route 619
- Route 42
- Route 221
- Route 460
- Route 252
- Route 340
- Route 16
- Route 60
- Route 269
- Route 220
- Route 151
- Route 29
- Route 33

On a regional scale, I-95 and a combined path of I-65/I-64/I-79 can also be expected to see some diversion. The following sections discuss potential traffic impacts to these locations.

2.3.1 U.S. Route 11

The impact to local roadways would be a factor of both the resulting congestion and the overall increase in volume. Areas with volume to capacity (v/c) ratios that indicate a roadway is at capacity (around 0.9) have a high potential to be impacted by a relatively small amount of traffic. Conversely, areas with v/c ratios well below capacity (less than 0.4) can sustain much higher increases in traffic without being substantially impacted.

Based on the theoretical capacity of a roadway facility, generalizations can be made about the amount of traffic that facility can handle while still being able to process traffic flow appropriately. The following assumptions were developed to rate individual sections of roadway as either Low, Moderate, or High potential for impact:

- Low Impact Potential: A v/c ratio below .4 and an increase of traffic below 3,000 vehicles per day per lane has a low potential for impact.
- Moderate Impact Potential: Any increase over 3,000 vehicles per day per lane OR any v/c ratio over .7 has at least a moderate potential for impact.
- High Impact Potential: A v/c ratio over .9 and an increase of traffic over 500 vehicles per day per lane has a high potential for impact.

The majority of the corridor is projected to have Low Potential for impact. However, as can be observed in Figures 2-2 and 2-3 (for U.S. Route 11 only), there are some isolated areas with a High Potential for adverse impacts from toll diversion. Table 2-8 summarizes these areas.

Table 2-8 Locations with High Impact Potential

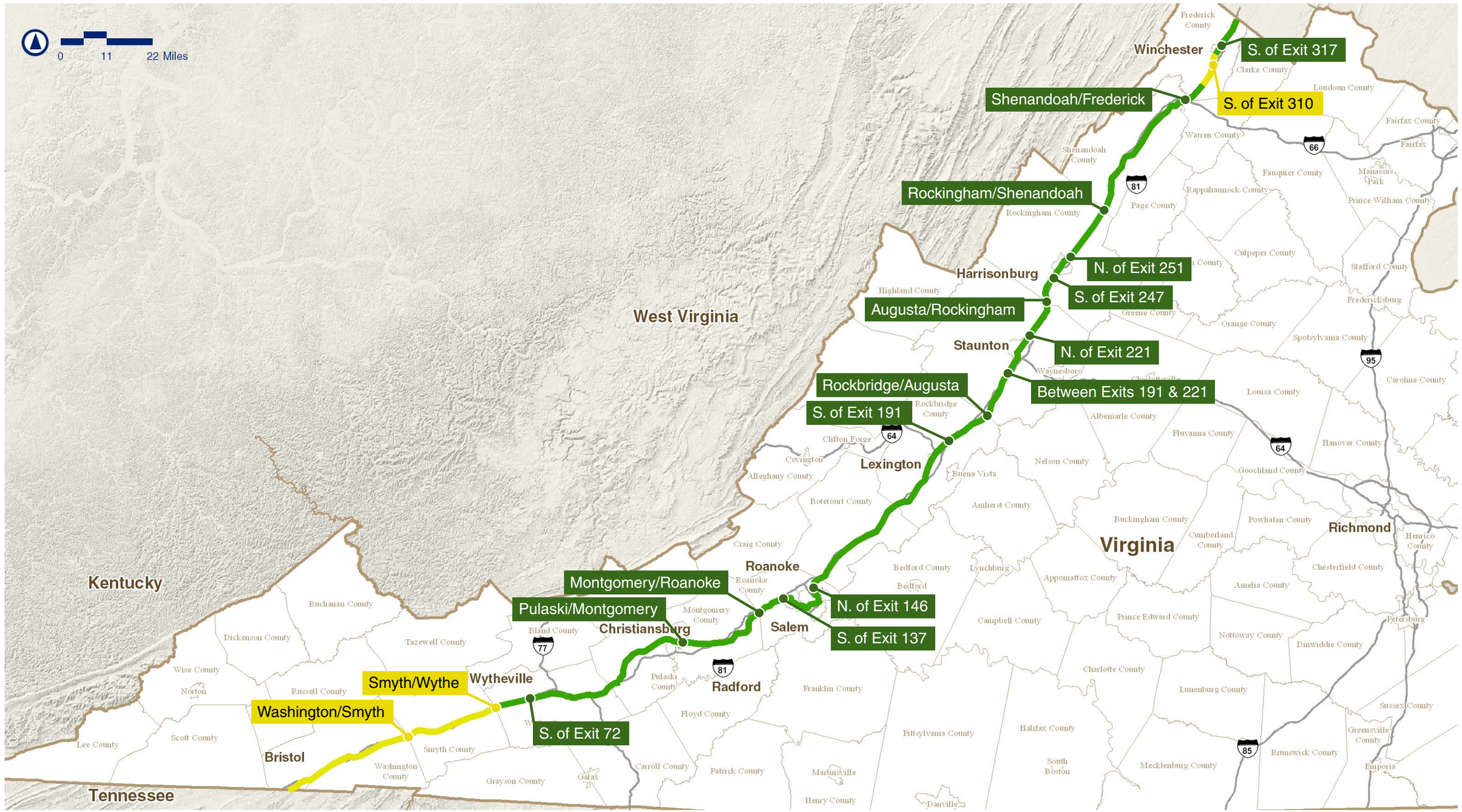
Location	Route	Volume Increase (vpd)	Existing v/c Ratio
Washington/Smyth Co. Line (High Toll)	U.S. 11	7,425	0.80
Smyth/Wythe Co. Line (High Toll)	U.S. 11	12,605	0.87

vpd vehicles per day

As shown, two areas have the potential for high impacts under the High Toll scenario. In the southern portion of the study area, impacts in Smyth County are due to large increases in volume on roadways with modest v/c ratios. Further north, in the Winchester area, modest volume increases occur on already congested roadways (roadways with high v/c ratios). Therefore, the ability for U.S. Route 11 to handle even a small increase in traffic volume is reduced.

Even though some areas may have high v/c ratios, the impact of toll diversion on local roadways is not considered to be substantial because of the minor increases (or no increase at all) expected in traffic volumes. For example, Highway 252 at the Rockbridge/Augusta County line has a v/c ratio of 1.38 for the High Toll scenario. This number is not influenced by toll diversion as the traffic volume actually decreases from the base No Toll case. This decrease is due to the availability of an uncontested I-81 facility that attracts more local traffic from the congested local roadway.

There are no locations where large volume increases and high v/c ratios exist. Some congested areas show very low increases, if not decreases, in traffic. Roadways with operating v/c ratios at 0.8 and above in the No-Build condition, typically can not support large increases of traffic. Either the actual road can not physically handle much additional volume, or users choose not to use that road because of the high congestion. This is illustrated in Figure 2.4.



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- Low Potential for Impacts
- Moderate Potential for Impacts
- High Potential for Impacts

North

Estimated Impacts of Potential Traffic Diversion to U.S. Route 11 (Low Toll)

Figure 2-2

I-81 CORRIDOR IMPROVEMENT STUDY

0 11 22 Miles

West Virginia

Kentucky

Tennessee

Virginia

Winchester

S. of Exit 317

S. of Exit 310

Shenandoah/Frederick

Rockingham/Shenandoah

N. of Exit 251

Harrisonburg

S. of Exit 247

Augusta/Rockingham

Staunton

N. of Exit 221

Between Exits 191 & 221

Rockbridge/Augusta

S. of Exit 191

Lexington

Roanoke

Montgomery/Roanoke

N. of Exit 146

Pulaski/Montgomery

Christiansburg

Salem

S. of Exit 137

Radford

Smyth/Wythe

Wytheville

Washington/Smyth

S. of Exit 72

Bristol

Richmond

Frederick County

Clarke County

Loudoun County

Fairfax County

Fairfax

Warren County

Shenandoah County

Fauquier County

Manassas Park

Rappahannock County

Page County

Prince William County

Rockingham County

Culpeper County

Stafford County

Highland County

Greene County

Fredericksburg

Orange County

Spotsylvania County

Waynesboro

Caroline County

Louisa County

Albemarle County

Fluvanna County

Hanover County

Rockbridge County

Clifton Forge

Covington

Alleghany County

Nelson County

Buena Vista

Goochland County

Botetourt County

Amherst County

Buckingham County

Cumberland County

Powhatan County

Henrico County

Craig County

Roanoke County

Bedford County

Bedford

Lynchburg

Appomattox County

Chesterfield County

Amelia County

Campbell County

Prince Edward County

Petersburg

Nottoway County

Dinwiddie County

Bland County

Montgomery County

Buchanan County

Dickenson County

Tazewell County

Wise County

Norton

Russell County

Pulaski County

Floyd County

Charlotte County

Lunenburg County

Sussex County

Greensville County

Lee County

Scott County

Smyth County

Washington County

Grayson County

Galax

Carroll County

Patrick County

Martinsville

Henry County

Danville

Pittsylvania County

Halifax County

South Boston

Mecklenburg County

Brunswick County

Emporia

Franklin County

66

81

77

64

95

85

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Low Potential for Impacts

Moderate Potential for Impacts

High Potential for Impacts

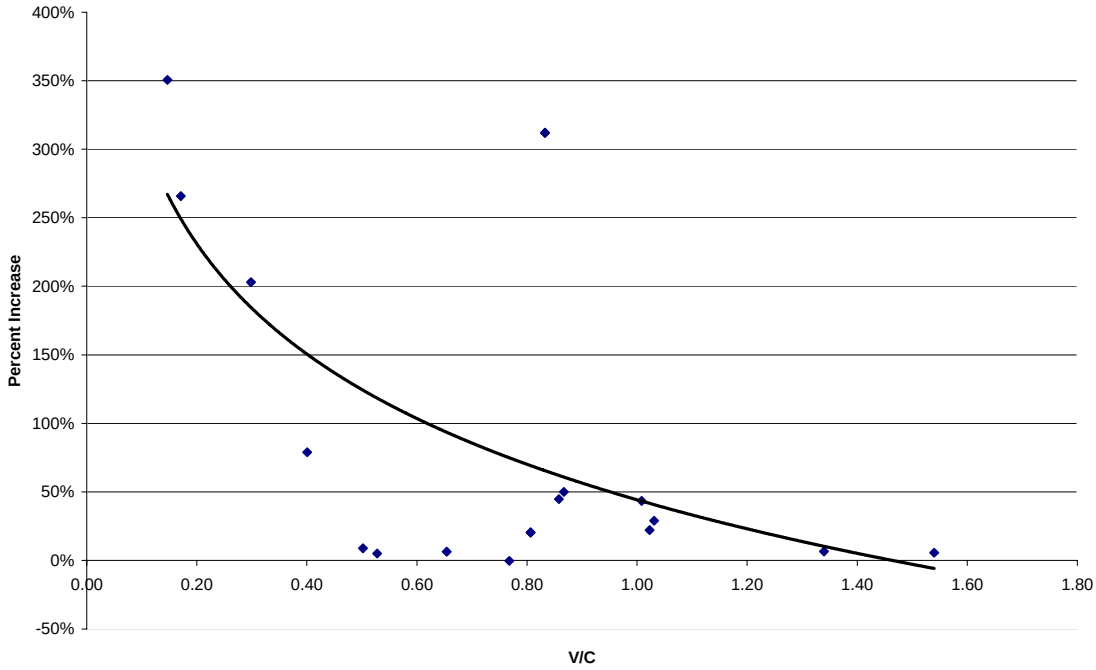
North

Estimated Impacts of Potential Traffic Diversion to U.S. Route 11 (High Toll)

Figure 2-3

I-81 CORRIDOR IMPROVEMENT STUDY

Figure 2-4 V/C Ratio vs. Percent Toll Diversion Increases for U.S. Route 11



2.3.2 Other Routes

U.S. Route 11 closely parallels I-81 throughout Virginia and it is expected that this route would absorb about half of all trips diverting from I-81 due to tolls. While there are several other routes (identified above and in Tables 2-6 and 2-7) that are likely to experience some diversion, these routes are not expected to have substantial traffic impacts.

Interstate Freight Traffic

An investigation of freight diversion to parallel interstate facilities was also included as part of the study of diversion. Of the freight trips that divert to parallel routes, about 71 percent would divert to a local route (these are identified above in Tables 2-6 and 2-7 and in Appendix A). About 14 percent would divert to I-95 and about 15 percent to I-65/I-64/I-79. These diversions are not expected to have a measurable impact to traffic operations on the parallel interstates.

2.4 Conclusions

This analysis focused on corridor-length conditions and on individual roadway segments. Intersection configurations and capacities and local roadway conditions could further influence congestion on local roadways and would be addressed in Tier 2, if a "Build" concept (or portion of a "Build" concept) is advanced. When

reviewing this diversion analysis it is important to remember that the percentages listed tend to be higher on smaller facilities as differences in smaller numbers can be more dramatic when expressed as a percent change. Therefore, it can be concluded that while the percentages may seem high, the actual impact resulting from the number of vehicles is low.

An expanded I-81 without tolls would generally improve conditions on U.S. Route 11 and other local roadways in the I-81 study area by diverting traffic from these local roadways to the interstate. This is especially true in the more populated and urban areas.

The implementation of a low toll on I-81 would gradually begin to shift traffic back to the local roadway network, although in most locations traffic volumes would still be below 2035 No-Build predictions. However, the implementation of higher tolls on I-81 would result in slight increases in local traffic throughout much of the study area as compared to the No-Build condition. Even though about half of the traffic would divert to U.S. Route 11, the resulting increase is slight for this type of roadway (a rural principal arterial) and the overall impact is low. The impact of tolls on the traffic operations of the local roadways would not be substantial. Areas with a high potential for local roadway impacts are sporadic throughout the corridor. Other parallel facilities would experience an even smaller impact due to traffic diversion.

Regardless of the toll scenario, if all vehicles are tolled, an expanded I-81 would decrease truck traffic on local roadways to levels below what are projected under 2035 No-Build conditions. As described in Section 1.2.5, this is because a commercial trucker's value of time is higher than that of a passenger car. Therefore the perceived time penalty of an imposed toll is less for a trucker, and they are less likely to divert from I-81 than a passenger car.

The inclusion of tolls would have a resulting effect on the I-81 cross-section necessary to meet the 2035 traffic demands. This is particularly noticeable in the area surrounding Abingdon and from Harrisonburg to Strasburg, where as a result of tolls, the necessary cross-section can be reduced by one-lane in each direction (the exact length of this reduction depends on the toll scenario). The cross-section analysis based on the different concepts would be explored in more detail if a "Build" concept (or portion of a "Build" concept) is advanced to Tier 2.

Large volume increases over the No-Build condition are not anticipated as a result of toll diversion at any location on U.S. Route 11. In most locations, with an improved I-81, traffic volumes along U.S. Route 11 would be below 2035 No-Build projections. With regard to trucks, if all vehicles are tolled, an expanded I-81 would decrease truck traffic on local roadways to levels below what are projected under 2035 No-Build conditions.

A

Appendix A

- User Survey Results Summary
- I-81 User Survey Data Location Summary
- I-81 Modeled Diversion Estimates

User Survey Results Summary

I-81 Users Survey Summary

Work Methodology

The survey was conducted over the course of two separate trips. The first of these was a two-day trip with one team of surveyors that would cover the Roanoke and Lexington areas. However, that trip did not produce enough respondents (300 minimum) so a second trip to the Harrisonburg and Staunton areas was conducted with two teams of surveyors.

Wednesday, June 9, 2004 – Roanoke Area
Surveys were collected at an Exxon Gas Station at Exit Number 146 from approximately 9am to 12pm. This station is located east of I-81 and is less than 0.5 miles from the Interstate. Additional surveys were collected at a Citgo Gas Station at Exit 150 from approximately 1pm to 6pm. This station is located on the east side of I-81 and is less than 0.5 miles from the Interstate.

At both locations above, the surveyors obtained permission from the gas station owner or manager and showed the field authorization letter from VDOT and had a survey available to the manager/owner if requested.

Surveyors waited until possible respondents had begun to fill up their fuel tanks before initiating the survey with them. If the potential respondent began to work on his/her car or was doing anything aside from pumping gas, he/she was not confronted with a survey. It was made clear the survey was for informational purposes only and was a part of study for VDOT. The survey was conducted as quickly as possible in an attempt to be unobtrusive to the respondent's personal schedule. Business cards were provided when requested.

Thursday, June 10, 2004 – Lexington Area
Surveys were collected at a Crown Gas Station near Exit 195 from approximately 8:30am to 12:30pm. This station is located west of I-81 and is less than 0.5 miles from the Interstate. Additional surveys were collected at a rest area located at approximate milepost 232 on I-81 from about 1:30pm to 5:30pm. The rest area surveyed was on the northbound side of the interstate.

At the gas station, permission was obtained to conduct the survey in the same manner as the day before. Surveys were conducted in the same manner as the day before. The rest area is considered public and no local special permission was obtained.

At the rest area, surveyors continued the theme of being unobtrusive to respondents. Surveyors waited outside the rest rooms, but only surveying those leaving the rest rooms. Care was taken to avoid interviewing commercial truck drivers.

During these two days, a total of approximately 180 surveys were collected. The majority of the respondents lived out of state. It was determined another trip to the corridor to obtain the goal of 300 surveys with more local users was necessary.

Wednesday, June 16, 2004 – Harrisonburg and Staunton Areas

Surveys were collected at a BP Gas Station in Harrisonburg near Exit 247 from approximately 8:45am to 2:00pm. This station is located east of I-81 and is less than 0.5 miles from the interstate. Simultaneously, surveys were also collected at a Sheetz Gas Station in Staunton located at Exit 222 during the same time frame. This station is located west of I-81 and is less than 0.5 mile from the interstate. These locations were chosen to obtain more local respondents.

Surveys were conducted in the same manner as had been established in Roanoke and Lexington.

Data Analysis

A total of 309 surveys were completed over the course of the 3 days. 53 non-respondents were recorded as well, the majority of these at the rest area where people seemed more rushed and unwilling to stop to take a survey. Most respondents were very cooperative at the gas stations since they did not have "anything else better to do" while pumping gas.

The data has been sorted and broken down into out-of-state (regional) and in-state (local) respondents. While most users (local and regional) would pay a minimal toll if it was enforced before diverting, nearly half of all users would oppose implementing a toll if put to a vote.

In general, the difference in opinions from local to regional users did not seem to vary too much. The percentage breakdowns of responses were very similar to each question, with the exception of the safety issues. Local users were much more likely to perceive trucks as a safety concern on I-81 than regional users. Perceptions of safety concerns also were higher for local users when related to too much traffic and high speeds.

When presented with the increasingly higher toll rates (questions 8-10), trends for local and regional users' responses paralleled each other. Around 75% of users, regardless of where they live, indicated they would pay a $3 toll if it was implemented without diverting off of I-81. However, of those 75%, only about 1/3 indicated they would pay the $6 toll before diverting from I-81. Of those

respondents indicating they would pay the $6 toll, less than 1/3, or less than 10% of the whole survey group, would pay a $10 toll before diverting.

The I-81 User Survey Data Location Summary gives the percentages and responses to each question and should be examined for more detailed information.

I-81 User Survey Data Location Summary

FINAL ANALYSIS

TOTAL # OF SURVEYS: 309
NON-RESPONDENTS: 53
Dates: June 9th, 10th, and 16th of 2004

QUESTIONS:	ANSWERS:	
# Statement	# Recorded	Percentage
1) How far away do you live?		
a. Within 20 miles	89	29%
b. Greater than 20 miles, but within the Commonwealth of Virginia	66	21%
c. Out of state	154	50%

	LOCAL ANSWERS:		REGIONAL ANSWERS:	
	# Recorded	Percentage	# Recorded	Percentage
2) How often do you travel on I-81?				
a. Daily	54	35%	0	0%
b. Weekly	50	32%	8	5%
c. Monthly	31	20%	24	16%
d. Less often than monthly	20	13%	122	79%
3) What is the general purpose of your trip today?				
a. Work/business related?	58	37%	16	10%
b. Personal Business (Shopping, Medical, School, Meals, etc)	80	52%	50	32%
c. Recreational (Vacation, etc)	17	11%	86	56%
d. Other	0	0%	2	1%
4) In what location did you begin your trip today and to what location are you heading?	N/A for analysis		N/A for analysis	
5) Do you perceive safety problems on I-81? If so what are they?				
a. No safety problems	37	24%	75	49%
b. Truck traffic	84	54%	51	33%
c. High speeds	25	16%	11	7%
d. Too much traffic	29	19%	17	11%
e. Hilly terrain	3	2%	7	5%
f. Locations without adequate shoulders	1	1%	5	3%
g. Entrances and Exits	11	7%	2	1%
h. Other drivers	17	11%	11	7%
i. Other	20	13%	17	11%
6) Do you favor the use of tolls on I-81 to fund transportation improvements in the corridor if traditional funding is not available?				
a. Yes	67	43%	71	46%
b. No	68	44%	74	48%
c. Don't Know	20	13%	9	6%
7) Would you support a $3.00 one-way toll on I-81 to reduce travel time from Roanoke to Harrisonburg from 2 $^{1/2}$ hours to 1 hour 40 minutes?				
a. Yes	83	54%	81	53%
b. No	57	37%	60	39%
c. Don't Know	15	10%	13	8%

QUESTIONS:	ANSWERS: # Recorded	ANSWERS: Percentage	ANSWERS: # Recorded	ANSWERS: Percentage
8) If there were a $3.00 toll on I-81 to go from Roanoke to Harrisonburg and you had to make a personal trip would you pay the toll on I-81, use Route 11 or take a different route?				
a. Pay Toll	109	70%	118	77%
b. Use Route 11	27	17%	5	3%
c. Use different route	19	12%	31	20%
9) If the toll was $6.00 for the same trip would you pay the toll on I-81, use Route 11 or take a different route?				
a. Pay Toll	35	23%	48	31%
b. Use Route 11	38	25%	4	3%
c. Use different route	36	23%	66	43%
d. N/A (Due to answer from question 8)	46	30%	36	23%
10) If the toll was $10.00 would you pay the toll on I-81, use Route 11 or take a different route?				
a. Pay Toll	11	7%	18	12%
b. Use Route 11	9	6%	2	1%
c. Use different route	16	10%	28	18%
d. N/A (Due to answer from question 8 or 9)	119	77%	106	69%
11) Suppose improvements were made on I-81 that separated truck traffic from passenger cars. What is the maximum toll you'd be willing to pay before you diverted from I-81 to another route?				
a. None	29	19%	29	19%
b. 0 to less than $2.00	27	17%	17	11%
c. $2.00 to less than $5.00	63	41%	51	33%
d. $5.00 to less than $10.00	28	18%	42	27%
e. $10.00 to less than $15.00	7	5%	11	7%
f. $15.00 to less than $20.00	0	0%	3	2%
g. $20.00 and above	1	1%	1	1%
12) If the tolls were priced higher in the peak periods and lower in the off-peak would it change your travel choices?				
a. Yes (Always)	55	35%	56	36%
b. Sometimes	19	12%	5	3%
c. No (Never)	81	52%	93	60%
13) Would you be likely to change you travel time of day or your travel route to avoid a toll? If so, which one?				
a. Travel time of day	37	24%	46	30%
b. Travel route	37	24%	15	10%
c. N/A (Due to answer from question 12)	81	52%	93	60%

I-81 Modeled Diversion Estimates

I81 Virginia Corridor

		No Build			6/8 Lane Configuration			6/8 Lane Configuration					6/8 Lane Configuration					6/8 Lane Configuration					6/8 Lane Configuration				
		No Toll						Low Toll ($0.08 per mi/veh car, $0.04 per mi/axle truck)					High Toll ($0.14 per mi/veh car, $0.07 per mi/axle truck)					Truck Only Low Toll ($0.04 per mi/axle truck)					Truck Only High Toll ($0.07 per mi/axle truck)				
County Line	Facility Name	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)	Tot Veh	Diversion (Tot Veh)	Trucks	Diversion (Trucks)	V/C Ratio (LOS E)
Washington/Smyth	*I81*	*62,660*	*18,695*	*0.71*	*64,200*	*19,115*	*0.49*	*56,095*	*-12.6%*	*18,535*	*-3.0%*	*0.42*	*49,695*	*-22.6%*	*16,820*	*-12.0%*	*0.38*	*63,950*	*-0.4%*	*18,480*	*-3.3%*	*0.48*	*58,760*	*-8.5%*	*12,805*	*-33.0%*	*0.45*
	U11	7,210	10	0.40	6,985	10	0.39	12,500	79%	35		0.69	14,410	106%	1,285		0.80	6,680		45		0.37	10,280		4,190		0.57
	Hwy 91	17,080	5	1.31	16,955	5	1.30	17,260		5		1.33	17,660		5		1.36	16,835		5		1.30	16,970		5		1.31
Smyth/Wythe	*I81*	*59,090*	*19,030*	*0.67*	*60,140*	*19,445*	*0.46*	*50,055*	*-16.8%*	*18,880*	*-2.9%*	*0.38*	*40,755*	*-32.2%*	*17,165*	*-11.7%*	*0.31*	*58,615*	*-2.5%*	*17,965*	*-7.6%*	*0.44*	*52,845*	*-12.1%*	*11,335*	*-41.7%*	*0.40*
	U11	3,075	0	0.17	3,010	0	0.17	11,010	266%	5		0.61	15,615	419%	1,315		0.87	3,970		885		0.22	8,590		5,990		0.48
	Hwy 42	385	0	0.03	380	0	0.03	645		5		0.05	1,555		175		0.12	385		5		0.03	385		5		0.03
Wythe/Pulaski	*I81*	*80,610*	*20,900*	*0.92*	*94,050*	*26,350*	*0.53*	*87,270*	*-7.2%*	*25,395*	*-3.6%*	*0.50*	*77,330*	*-17.8%*	*24,320*	*-7.7%*	*0.44*	*91,185*	*-3.0%*	*23,250*	*-11.8%*	*0.52*	*89,400*	*-4.9%*	*20,925*	*-20.6%*	*0.51*
	Hwy 42	1,770	5	0.14	1,705	5	0.13	1,785		5		0.14	2,000		5		0.15	1,710		5		0.13	1,705		5		0.13
	U221	12,395	675	0.69	11,345	240	0.63	12,025		390		0.67	12,940		450		0.72	11,545		470		0.64	11,900		745		0.66
Pulaski/Montgomery	*I81*	*80,160*	*22,425*	*0.91*	*91,990*	*26,335*	*0.52*	*83,980*	*-8.7%*	*25,495*	*-3.2%*	*0.48*	*76,420*	*-16.9%*	*24,415*	*-7.3%*	*0.43*	*89,360*	*-2.9%*	*23,380*	*-11.2%*	*0.51*	*87,685*	*-4.7%*	*21,190*	*-19.5%*	*0.50*
	U11	18,075	20	0.50	15,985	15	0.44	17,395	9%	10		0.48	19,820	24.0%	10		0.55	16,010		25		0.44	16,095		30		0.45
Montgomery/Roanoke	*I81*	*88,485*	*22,620*	*1.01*	*103,180*	*27,880*	*0.59*	*98,095*	*-4.9%*	*26,435*	*-5.2%*	*0.56*	*90,190*	*-12.6%*	*25,290*	*-9.3%*	*0.51*	*101,300*	*-1.8%*	*24,385*	*-12.5%*	*0.58*	*98,935*	*-4.1%*	*20,705*	*-25.7%*	*0.56*
	U11	23,550	1,485	0.65	17,285	0	0.48	18,390	6%	280		0.51	23,025	33%	1,560		0.64	17,495		350		0.49	19,230		2,925		0.53
	Hwy 42	2,820	450	0.22	1,580	0	0.12	2,020		15		0.16	2,565		25		0.20	1,605		0		0.12	1,880		40		0.14
Roanoke/Botetourt	*I81*	*95,935*	*21,560*	*1.20*	*119,410*	*28,425*	*0.75*	*111,090*	*-7.0%*	*27,210*	*-4.3%*	*0.69*	*106,245*	*-11.0%*	*27,450*	*-3.4%*	*0.66*	*117,665*	*-1.5%*	*25,070*	*-11.8%*	*0.74*	*116,075*	*-2.8%*	*22,725*	*-20.1%*	*0.73*
	U11	25,810	1,510	0.81	17,085	15	0.53	20,570	20.4%	20		0.64	21,720	27.1%	10		0.68	17,045		280		0.53	17,910		1,400		0.56
	US 460	35,070	1,970	1.10	29,850	180	0.93	31,200		220		0.98	32,900		130		1.03	31,100		180		0.97	29,930		480		0.97
Botetourt/Rockbridge	*I81*	*85,105*	*20,745*	*0.97*	*92,675*	*24,690*	*0.53*	*88,220*	*-4.8%*	*23,485*	*-4.9%*	*0.50*	*82,440*	*-11.0%*	*23,100*	*-6.4%*	*0.47*	*90,925*	*-1.9%*	*21,490*	*-13.0%*	*0.52*	*89,785*	*-3.1%*	*20,260*	*-18.0%*	*0.51*
	I64	35,100	7,690	0.40	30,560	4,680	0.35	33,280		5,780		0.38	36,690		5,630		0.42	32,105		7,325		0.36	33,035		8,240		0.38
	US 460	63,250	4,390	1.44	63,640	4,450	1.45	63,470		4,400		1.44	64,680		4,400		1.47	63,540		4,470		1.44	63,540		4,420		1.44
	U220	6,335	960	0.35	4,530	395	0.25	5,895		465		0.33	6,440		790		0.36	5,015		895		0.28	5,195		1,065		0.29
Rockbridge/Augusta	*I81*	*99,870*	*24,640*	*1.13*	*120,110*	*29,330*	*0.68*	*114,355*	*-4.8%*	*28,625*	*-2.4%*	*0.65*	*103,935*	*-13.5%*	*28,050*	*-4.4%*	*0.59*	*119,600*	*-0.4%*	*28,460*	*-3.0%*	*0.68*	*118,990*	*-0.9%*	*28,155*	*-4.0%*	*0.68*
	U11	14,985	3,520	0.83	500	5	0.03	2,060	312%	5		0.11	10,350	1970%	10		0.58	0		0		0.00	580		10		0.06
	Hwy 252	10,635	95	1.33	11,190	90	1.40	10,925		100		1.37	11,035		105		1.38	11,115		90		1.39	11,180		90		1.40
	US 29	20,500	4,600	0.47	19,850	4,170	0.45	22,145		4,570		0.50	23,020		4,780		0.52	21,420		4,490		0.49	20,040		4,630		0.49
	Hwy 42	4,745	115	0.37	3,515	40	0.27	3,930		50		0.30	4,535		60		0.35	3,555		100		0.27	3,520		105		0.27
Augusta/Rockingham	*I81*	*92,055*	*24,195*	*1.05*	*107,810*	*27,710*	*0.61*	*96,260*	*-10.7%*	*26,700*	*-3.7%*	*0.55*	*93,035*	*-13.7%*	*24,930*	*-10.0%*	*0.53*	*106,745*	*-1.0%*	*25,670*	*-7.4%*	*0.61*	*105,570*	*-2.1%*	*22,100*	*-20.3%*	*0.60*
	U11	15,605	1,620	0.87	9,780	25	0.54	14,670	50%	45		0.82	15,240	56%	1,605		0.85	9,840		195		0.55	10,705		3,070		0.59
	Hwy 42	12,610	25	0.97	10,835	10	0.83	12,185		20		0.94	12,695		15		0.98	10,810		20		0.83	11,050		25		0.85
	U340	13,220	290	0.73	13,190	50	0.73	13,890		115		0.77	13,280		215		0.74	13,445		245		0.75	13,375		235		0.74
Rockingham/Shenandoah	*I81*	*86,590*	*22,020*	*0.98*	*97,875*	*24,355*	*0.74*	*88,535*	*-9.5%*	*23,895*	*-1.9%*	*0.67*	*84,300*	*-13.9%*	*24,795*	*1.8%*	*0.64*	*94,200*	*-3.8%*	*16,735*	*-31.3%*	*0.71*	*92,265*	*-5.7%*	*13,885*	*-43.0%*	*0.70*
	U11	18,150	3,850	1.01	12,085	2,355	0.67	17,335	43%	2,225		0.96	19,710	63%	1,610		1.10	15,105		8,850		0.84	17,455		11,235		0.97
	Hwy 42	4,295	10	0.54	3,710	5	0.46	5,130		10		0.64	5,185		15		0.65	3,655		10		0.46	3,605		15		0.45
	U211	20,660	15	0.47	22,395	10	0.51	18,930		15		0.43	19,220		20		0.44	22,210		15		0.50	22,585		20		0.51
	U340	11,750	125	0.65	9,610	110	0.53	11,120		285		0.62	12,325		205		0.68	9,630		360		0.53	9,565		390		0.53
Shenandoah/Frederick	*I81*	*88,220*	*15,730*	*1.00*	*100,125*	*17,785*	*0.57*	*88,740*	*-11.4%*	*17,145*	*-3.6%*	*0.50*	*81,180*	*-18.9%*	*16,455*	*-7.5%*	*0.46*	*98,410*	*-1.7%*	*15,250*	*-14.2%*	*0.56*	*97,020*	*-3.1%*	*12,340*	*-30.6%*	*0.55*
	U11	15,445	2,635	0.86	8,040	650	0.45	11,640	45%	1,200		0.65	15,330	91%	1,850		0.85	9,645		2,880		0.54	11,555		5,825		0.64
	Hwy 628	5,105	10	0.64	2,325	0	0.29	3,545		5		0.44	3,790		5		0.47	2,775		5		0.35	2,880		5		0.36
	U522	26,685	60	1.21	27,265	60	1.24	27,350		65		1.24	26,080		60		1.19	26,995		60		1.23					

Corridor Statistics

Total VMT on I-81	27,698,411	31,493,593	28,775,784	26,171,792			
Total VMT on US 11	6,225,859	5,189,879	6,302,701	7,028,188			
Total Delay (hours) on I-81	6.0	1.0	0.8	0.6			
Total Delay (hours) on US 11	6.1	3.7	5.7	7.1			

I81 Virginia Corridor

Toll Diversion Summary - Additional Cutlines

		No Build			6/8 Lane			6/8 Lane Configuration					6/8 Lane Configuration					6/8 Lane Configuration					6/8 Lane Configuration				
		No Toll						Low Toll ($0.08 per mi/veh car, $0.04 per mi/axle truck)					High Toll ($0.14 per mi/veh car, $0.07 per mi/axle truck)					Truck Only Low Toll ($0.04 per mi/axle truck)					Truck Only High Toll ($0.07 per mi/axle truck)				
Location	Facility Name	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)
TN State Line	*I81*	*54,640*	*8,885*	*0.72*	*54,640*	*8,885*	*0.48*	*54,640*	*0.0%*	*8,885*	*0.0%*	*0.48*	*54,640*	*0.0%*	*8,885*	*0.0%*	*0.48*	*54,640*	*0.0%*	*8,885*	*0.0%*	*0.48*	*54,640*	*0.0%*	*8,885*	*0.0%*	*0.48*
	U11W	27,065	2,910	0.80	27,065	2,910	0.80	27,065		2,910		0.80	27,065		2,910		0.80	27,065		2,910		0.80	27,065		2,910		0.80
	U19	33,770	3,620	0.84	33,770	3,620	0.84	33,770		3,620		0.84	33,770		3,620		0.84	33,770		3,620		0.84	33,770		3,620		0.84
	U421	25,760	2,875	0.64	25,760	2,875	0.64	25,760		2,875		0.64	25,760		2,875		0.64	25,760		2,875		0.64	25,760		2,875		0.64
South of Exit #72 (South of I-77)	*I81*	*59,370*	*17,515*	*0.78*	*64,980*	*19,565*	*0.43*	*54,545*	*-16.1%*	*19,030*	*-2.7%*	*0.36*	*44,150*	*-32.1%*	*17,705*	*-9.5%*	*0.29*	*63,565*	*-2.2%*	*18,090*	*-7.5%*	*0.42*	*54,640*	*-15.9%*	*9,025*	*-53.9%*	*0.36*
	U11	4,985	1,680	0.15	2,125	120	0.06	9,575		130			15,260		1,180			2,930		915		0.09	10,650		8,455		0.31
	Hwy 619	6,665	215	0.83	5,335	145	0.67	6,240		140		0.78	6,700		165		0.84	5,385		240		0.67	5,435		240		0.68
	U52	6,310	0	0.35	6,085	0	0.34	6,540		5		0.36	6,860		10		0.38	6,085		5		0.34	6,085		5		0.34
Between Exit #72 and #81 (I 77 Overlap)	*I81 / U11*	*91,460*	*23,870*	*1.04*	*102,090*	*27,640*	*0.58*	*94,660*	*-7.3%*	*26,845*	*-2.9%*	*0.54*	*87,550*	*-14.2%*	*25,765*	*-6.8%*	*0.50*	*99,600*	*-2.4%*	*24,730*	*-10.5%*	*0.57*	*97,690*	*-4.3%*	*22,655*	*-18.0%*	*0.56*
	Hwy 610	7,500	5	0.94	6,515	5	0.81	7,165		5		0.90	7,605		5		0.95	6,255		5		0.78	6,575		5		0.82
	Hwy 619	6,665	215	0.83	5,335	145	0.67	6,240		140		0.78	6,700		165		0.84	5,385		240		0.67	5,435		240		0.68
	U52	11,805	5	0.66	11,790	10	0.66	11,815		10		0.66	12,005		10		0.67	11,785		10		0.65	11,790		5		0.66
North of Exit #81 (North of I-77)	*I81 / U11*	*87,070*	*21,275*	*0.99*	*100,825*	*26,340*	*0.57*	*92,785*	*-8.0%*	*25,370*	*-3.7%*	*0.53*	*82,155*	*-18.5%*	*24,310*	*-7.7%*	*0.47*	*97,775*	*-3.0%*	*23,245*	*-11.8%*	*0.56*	*95,165*	*-5.6%*	*20,915*	*-20.6%*	*0.54*
	Frontage 042/043	3,140	940	0.39	100	0	0.01	395		20		0.05	4,585		0			100		0		0.01	0		0		0.00
	Hwy 42	11,805	5	0.91	11,790	10	0.91	11,815		10		0.91	12,005		10		0.92	11,785		10		0.91	11,790		5		0.91
	U221	3,725	385	0.21	4,930	185	0.27	3,795		220		0.21	3,865		285		0.21	4,985		260		0.28	5,050		390		0.28
South of Exit #137 (South of Roanoke)	*I81*	*94,790*	*22,545*	*1.18*	*109,935*	*27,880*	*0.69*	*105,375*	*-4.1%*	*26,705*	*-4.2%*	*0.66*	*100,865*	*-8.3%*	*26,850*	*-3.7%*	*0.63*	*108,245*	*-1.5%*	*24,730*	*-11.3%*	*0.68*	*107,275*	*-2.4%*	*23,625*	*-15.3%*	*0.67*
	U11	26,110	1,560	0.77	23,235	5	0.68	23,155		5		0.68	23,895		5		0.70	23,260		10		0.68	23,495		10		0.69
	Hwy 42	2,820	450	0.22	1,580	0	0.12	2,020		15		0.16	2,565		25		0.20	1,605		0		0.12	1,880		40		0.14
	U221	11,455	105	0.64	9,530	45	0.53	10,775		95		0.60	11,425		155		0.63	9,540		110		0.53	9,670		260		0.54
North of Exit #146 (North of Roanoke)	*I81*	*95,935*	*21,560*	*1.20*	*119,410*	*28,425*	*0.75*	*111,090*	*-7.0%*	*27,210*	*-4.3%*	*0.69*	*106,245*	*-11.0%*	*27,450*	*-3.4%*	*0.66*	*117,665*	*-1.5%*	*25,070*	*-11.8%*	*0.74*	*116,075*	*-2.8%*	*22,725*	*-20.1%*	*0.73*
	U11	25,810	1,510	0.81	17,085	15	0.53	20,570		20		0.64	21,720		10		0.68	17,045		280		0.53	17,910		1,400		0.56
South of Exit #191 (South of I-64)	*I81*	*86,140*	*20,205*	*0.98*	*97,105*	*25,355*	*0.55*	*90,935*	*-6.4%*	*23,805*	*-6.1%*	*0.52*	*80,630*	*-17.0%*	*22,975*	*-9.4%*	*0.46*	*95,160*	*-2.0%*	*22,010*	*-13.2%*	*0.54*	*93,330*	*-3.9%*	*19,955*	*-21.3%*	*0.53*
	U11	19,000	1,255	0.53	17,160	15	0.48	18,025		35		0.50	22,770		460		0.63	17,140		15		0.48	17,910		875		0.50
	U220	6,335	960	0.35	4,530	395	0.25	5,895		465		0.33	6,440		790		0.36	5,015		895		0.28	5,195		1,065		0.29
	U29	28,125	4,615	0.64	28,635	4,190	0.65	27,835		4,575		0.63	28,615		4,775		0.65	27,655		4,505		0.63	28,985		4,625		0.66
	U60	4,410	5	0.24	3,145	0	0.17	3,145		5		0.17	3,400		5		0.19	3,145		5		0.17	3,155		0		0.18
Between Exit #191 and #221 (I-64 Overlap)	*I81*	*99,870*	*24,640*	*1.13*	*120,110*	*29,330*	*0.68*	*114,355*	*-4.8%*	*28,625*	*-2.4%*	*0.65*	*103,935*	*-13.5%*	*28,050*	*-4.4%*	*0.59*	*119,600*	*-0.4%*	*28,460*	*-3.0%*	*0.68*	*118,990*	*-0.9%*	*28,155*	*-4.0%*	*0.68*
	U11	14,985	3,520	0.83	500	0	0.03	2,060		5			10,350		10			500		0		0.03	290		5		0.02
	Hwy 252	10,635	95	1.33	11,190	90	1.40	10,925		100		1.37	11,035		105		1.38	11,115		90		1.39	11,180		90		1.40
	Hwy 42	4,745	115	0.37	3,515	40	0.27	3,930		50		0.30	4,535		60		0.35	3,555		100		0.27	3,520		105		0.27
North of Exit #221 (North of I-64)	*I81*	*101,225*	*24,540*	*1.33*	*119,670*	*27,810*	*0.79*	*109,245*	*-8.7%*	*26,910*	*-3.2%*	*0.72*	*106,325*	*-11.2%*	*25,215*	*-9.3%*	*0.70*	*118,425*	*-1.0%*	*26,075*	*-6.2%*	*0.78*	*116,295*	*-2.8%*	*22,410*	*-19.4%*	*0.77*
	U11	10,150	1,400	0.30	3,775	5	0.11	11,440		10		0.34	10,940		1,595		0.32	3,715		5		0.11	7,605		2,990		0.22
	Hwy 275	7,860	15	0.98	8,090	15	1.01	7,950		20		0.99	8,750		25		1.09	8,320		5		1.04	7,775		5		0.97
	Hwy 42	6,940	35	0.53	5,035	20	0.39	6,500		30		0.50	7,010		25		0.54	5,000		35		0.38	5,220		35		0.40
	U220	3,675	1,120	0.20	1,710	315	0.09	3,085		600		0.17	3,645		955		0.20	2,165		785		0.12	2,355		955		0.13
	U340	16,615	175	0.92	17,795	30	0.99	17,305		30		0.96	16,585		30		0.92	17,640		35		0.98	17,580		35		0.98
South of Exit #247 (Harrisonburg)	*I81*	*93,590*	*25,045*	*1.23*	*110,490*	*27,600*	*0.73*	*101,815*	*-7.8%*	*26,655*	*-3.4%*	*0.67*	*96,700*	*-12.5%*	*24,865*	*-9.9%*	*0.64*	*108,525*	*-1.8%*	*25,665*	*-7.0%*	*0.71*	*109,875*	*-0.6%*	*22,070*	*-20.0%*	*0.72*
	U11	45,555	695	1.34	40,865	65	1.20	43,515		40		1.28	43,560		1,615		1.28	41,380		125		1.22	41,875		3,040		1.23
	Hwy 42	4,950	10	0.83	4,050	0	0.67	5,060		5		0.84	5,565		0		0.93	4,085		5		0.68	4,085		5		0.68
	U220	7,580	1,115	0.42	5,605	315	0.31	7,035		600		0.39	7,685		955		0.43	6,090		785		0.34	6,290		955		0.35
	U340	13,610	285	0.76	10,175	45	0.57	11,690		115		0.65	13,140		210		0.73	10,070		240		0.56	10,100		230		0.56
North of Exit #251 (Harrisonburg)	*I81*	*94,640*	*24,255*	*1.08*	*105,210*	*26,780*	*0.80*	*99,240*	*-5.7%*	*26,140*	*-2.4%*	*0.75*	*95,915*	*-8.8%*	*24,800*	*-7.4%*	*0.73*	*104,075*	*-1.1%*	*24,260*	*-9.4%*	*0.79*	*101,905*	*-3.1%*	*19,340*	*-27.8%*	*0.77*
	U11	18,560	1,705	1.03	12,250	35	0.68	15,795		50		0.88	17,805		1,645		0.99	12,590		1,420		0.70	14,705		5,850		0.82
	Hwy 42	12,600	0	1.57	12,300	0	1.54	12,335		0		1.54	12,760		0		1.60	12,335		0		1.54	12,230		0		1.53
	U220	6,490	575	0.36	5,985	545	0.33	6,665		570		0.37	6,850		610		0.38	6,070		555		0.34	6,030		580		0.34
	U340	11,460	120	0.64	9,090	110	0.50	10,970		280		0.61	11,810		205		0.66	9,075		355		0.50	8,985		390		0.50
South of Exit #310 (Winchester)	*I81*	*92,460*	*14,655*	*1.05*	*110,230*	*16,140*	*0.63*	*102,900*	*-6.7%*	*16,815*	*4.2%*	*0.58*	*93,085*	*-15.6%*	*15,505*	*-3.9%*	*0.53*	*108,150*	*-1.9%*	*13,940*	*-13.6%*	*0.61*	*111,850*	*1.5%*	*11,490*	*-28.8%*	*0.64*
	U11	18,405	2,245	1.02	15,300	910	0.85	18,695		705		1.04	19,765		1,660		1.10	16,050		2,435		0.89	16,290		4,605		0.90
	U17	40,945	2,375	1.14	41,280	2,450	1.15	42,955		2,605		1.19	43,940		2,400		1.22	43,475		2,005		1.21	41,850		1,880		1.16
	U220	8,990	675	0.50	7,640	640	0.42	10,150		660		0.56	9,825		660		0.55	7,690		640		0.43	7,725		640		0.43
	U522	32,545	235	0.90	28,350	90	0.79	32,660		90		0.91	32,960		65		0.92	28,255		185		0.78	28,855		210		0.80
South of Exit #317 (Winchester)	*I81*	*115,070*	*10,835*	*1.51*	*125,335*	*11,965*	*1.10*	*123,190*	*-1.7%*	*12,070*	*0.9%*	*1.08*	*117,980*	*-5.9%*	*12,015*	*0.4%*	*1.03*	*125,305*	*0.0%*	*11,760*	*-1.7%*	*1.10*	*126,020*	*0.5%*	*11,780*	*-1.5%*	*1.11*
	U11	72,375	1,045	1.54	26,720	730	1.48	28,220		665		1.57	29,735		550		1.65	26,620		565		1.48	28,085		560		1.56
WV State Line	*I81*	*84,780*	*10,220*	*0.96*	*84,780*	*10,220*	*0.64*	*84,780*	*0.0%*	*10,220*	*0.0%*	*0.64*	*84,780*	*0.0%*	*10,220*	*0.0%*	*0.64*	*84,780*	*0.0%*	*10,220*	*0.0%*	*0.64*	*84,780*	*0.0%*	*10,220*	*0.0%*	*0.64*
	U11	13,650	710	0.76	13,650	710	0.76	13,650		710		0.76	13,650		710		0.76	13,650		710		0.76	13,650		710		0.76

I81 Virginia Corridor
Toll Diversion Summary

		No Build			6/8 Lane Configuration											
		No Toll			No Toll			Low Toll ($0.08 per mi/veh car, $0.04 per mi/axle truck)					High Toll ($0.14 per mi/veh car, $0.07 per mi/axle truck)				
County Line	Facility Name	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)
Washington/Smyth	*I81*	*62,660*	*18,695*	*0.71*	*64,200*	*19,115*	*0.49*	*56,095*	*-12.6%*	*18,535*	*-3.0%*	*0.42*	*49,695*	*-22.6%*	*16,820*	*-12.0%*	*0.38*
	U11	7,210	10	0.40	6,985	10	0.39	12,500	79%	35		0.69	14,410	106%	1,285		0.80
	Hwy 91	17,080	5	1.31	16,955	5	1.30	17,260		5		1.33	17,660		5		1.36
Smyth/Wythe	*I81*	*59,090*	*19,030*	*0.67*	*60,140*	*19,445*	*0.46*	*50,055*	*-16.8%*	*18,880*	*-2.9%*	*0.38*	*40,755*	*-32.2%*	*17,165*	*-11.7%*	*0.31*
	U11	3,075	0	0.17	3,010	0	0.17	11,010	266%	5		0.61	15,615	419%	1,315		0.87
	Hwy 42	385	0	0.03	380	0	0.03	645		5		0.05	1,555		175		0.12
Wythe/Pulaski	*I81*	*80,610*	*20,900*	*0.92*	*94,050*	*26,350*	*0.53*	*87,270*	*-7.2%*	*25,395*	*-3.6%*	*0.50*	*77,330*	*-17.8%*	*24,320*	*-7.7%*	*0.44*
	Hwy 42	1,770	5	0.14	1,705	5	0.13	1,785		5		0.14	2,000		5		0.15
	U221	12,395	675	0.69	11,345	240	0.63	12,025		390		0.67	12,940		450		0.72
Pulaski/Montgomery	*I81*	*80,160*	*22,425*	*0.91*	*91,990*	*26,335*	*0.52*	*83,980*	*-8.7%*	*25,495*	*-3.2%*	*0.48*	*76,420*	*-16.9%*	*24,415*	*-7.3%*	*0.43*
	U11	18,075	20	0.50	15,985	15	0.44	17,395	9%	10		0.48	19,820	24.0%	10		0.55
Montgomery/Roanoke	*I81*	*88,485*	*22,620*	*1.01*	*103,180*	*27,880*	*0.59*	*98,095*	*-4.9%*	*26,435*	*-5.2%*	*0.56*	*90,190*	*-12.6%*	*25,290*	*-9.3%*	*0.51*
	U11	23,550	1,485	0.65	17,285	0	0.48	18,390	6%	280		0.51	23,025	33%	1,560		0.64
	Hwy 42	2,820	450	0.22	1,580	0	0.12	2,020		15		0.16	2,565		25		0.20
Roanoke/Botetourt	*I81*	*95,935*	*21,560*	*1.20*	*119,410*	*28,425*	*0.75*	*111,090*	*-7.0%*	*27,210*	*-4.3%*	*0.69*	*106,245*	*-11.0%*	*27,450*	*-3.4%*	*0.66*
	U11	25,810	1,510	0.81	17,085	15	0.53	20,570	20.4%	20		0.64	21,720	27.1%	10		0.68
	US 460	35,070	1,970	1.10	29,850	180	0.93	31,200		220		0.98	32,900		130		1.03
Botetourt/Rockbridge	*I81*	*85,105*	*20,745*	*0.97*	*92,675*	*24,690*	*0.53*	*88,220*	*-4.8%*	*23,485*	*-4.9%*	*0.50*	*82,440*	*-11.0%*	*23,100*	*-6.4%*	*0.47*
	I64	35,100	7,690	0.40	30,560	4,680	0.35	33,280		5,780		0.38	36,690		5,630		0.42
	US 460	63,250	4,390	1.44	63,640	4,450	1.45	63,470		4,400		1.44	64,680		4,400		1.47
	U220	6,335	960	0.35	4,530	395	0.25	5,895		465		0.33	6,440		790		0.36
Rockbridge/Augusta	*I81*	*99,870*	*24,640*	*1.13*	*120,110*	*29,330*	*0.68*	*114,355*	*-4.8%*	*28,625*	*-2.4%*	*0.65*	*103,935*	*-13.5%*	*28,050*	*-4.4%*	*0.59*
	U11	14,985	3,520	0.83	500	5	0.03	2,060	312%	5		0.11	10,350	1970%	10		0.58
	Hwy 252	10,635	95	1.33	11,190	90	1.40	10,925		100		1.37	11,035		105		1.38
	US 29	20,500	4,600	0.47	19,850	4,170	0.45	22,145		4,570		0.50	23,020		4,780		0.52
	Hwy 42	4,745	115	0.37	3,515	40	0.27	3,930		50		0.30	4,535		60		0.35
Augusta/Rockingham	*I81*	*92,055*	*24,195*	*1.05*	*107,810*	*27,710*	*0.61*	*96,260*	*-10.7%*	*26,700*	*-3.7%*	*0.55*	*93,035*	*-13.7%*	*24,930*	*-10.0%*	*0.53*
	U11	15,605	1,620	0.87	9,780	25	0.54	14,670	50%	45		0.82	15,240	56%	1,605		0.85
	Hwy 42	12,610	25	0.97	10,835	10	0.83	12,185		20		0.94	12,695		15		0.98
	U340	13,220	290	0.73	13,190	50	0.73	13,890		115		0.77	13,280		215		0.74
Rockingham/Shenandoah	*I81*	*86,590*	*22,020*	*0.98*	*97,875*	*24,355*	*0.74*	*88,535*	*-9.5%*	*23,895*	*-1.9%*	*0.67*	*84,300*	*-13.9%*	*24,795*	*1.8%*	*0.64*
	U11	18,150	3,850	1.01	12,085	2,355	0.67	17,335	43%	2,225		0.96	19,710	63%	1,610		1.10
	Hwy 42	4,295	10	0.54	3,710	5	0.46	5,130		10		0.64	5,185		15		0.65
	U211	20,660	15	0.47	22,395	10	0.51	18,930		15		0.43	19,220		20		0.44
	U340	11,750	125	0.65	9,610	110	0.53	11,120		285		0.62	12,325		205		0.68
Shenandoah/Frederick	*I81*	*88,220*	*15,730*	*1.00*	*100,125*	*17,785*	*0.57*	*88,740*	*-11.4%*	*17,145*	*-3.6%*	*0.50*	*81,180*	*-18.9%*	*16,455*	*-7.5%*	*0.46*
	U11	15,445	2,635	0.86	8,040	650	0.45	11,640	45%	1,200		0.65	15,330	91%	1,850		0.85
	Hwy 628	5,105	10	0.64	2,325	0	0.29	3,545		5		0.44	3,790		5		0.47
	U522	26,685	60	1.21	27,265	60	1.24	27,350		65		1.24	26,080		60		1.19
Total Delay (hours) on I-81			5.5			1.4			0.8					0.5			
Total Delay (hours) on US 11			3.3			1.3			2.6					4.0			

I81 Virginia Corridor
Toll Diversion Summary

			No Build			6/8 Lane Configuration							
			No Toll			No Toll			Truck Only Toll ($0.07 per mi/axle truck)				
County Line	Facility Name	HB	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)
Washington/Smyth	*I81*	#	*62,660*	*18,695*	*0.71*	*64,200*	*19,115*	*0.49*	*58,760*	*-8.5%*	*12,805*	*-33.0%*	*0.45*
	U11		7,210	10	0.40	6,985	10	0.39	10,280		4,190		0.57
	Hwy 91		17,080	5	1.31	16,955	5	1.30	16,970		5		1.31
Smyth/Wythe	*I81*	#	*59,090*	*19,030*	*0.67*	*60,140*	*19,445*	*0.46*	*52,845*	*-12.1%*	*11,335*	*-41.7%*	*0.40*
	U11		3,075	0	0.17	3,010	0	0.17	8,590		5,990		0.48
	Hwy 42		385	0	0.03	380	0	0.03	385		5		0.03
Wythe/Pulaski	*I81*	#	*80,610*	*20,900*	*0.92*	*94,050*	*26,350*	*0.53*	*89,400*	*-4.9%*	*20,925*	*-20.6%*	*0.51*
	Hwy 42		1,770	5	0.14	1,705	5	0.13	1,705		5		0.13
	U221		12,395	675	0.69	11,345	240	0.63	11,900		745		0.66
Pulaski/Montgomery	*I81*	#	*80,160*	*22,425*	*0.91*	*91,990*	*26,335*	*0.52*	*87,685*	*-4.7%*	*21,190*	*-19.5%*	*0.50*
	U11		18,075	20	0.50	15,985	15	0.44	16,095		30		0.45
Montgomery/Roanoke	*I81*	#	*88,485*	*22,620*	*1.01*	*103,180*	*27,880*	*0.59*	*98,935*	*-4.1%*	*20,705*	*-25.7%*	*0.56*
	U11		23,550	1,485	0.65	17,285	0	0.48	19,230		2,925		0.53
	Hwy 42		2,820	450	0.22	1,580	0	0.12	1,880		40		0.14
Roanoke/Botetourt	*I81*	#	*95,935*	*21,560*	*1.20*	*119,410*	*28,425*	*0.75*	*116,075*	*-2.8%*	*22,725*	*-20.1%*	*0.73*
	U11		25,810	1,510	0.81	17,085	15	0.53	17,910		1,400		0.56
	US 460		35,070	1,970	1.10	29,850	180	0.93	29,930		480		0.97
Botetourt/Rockbridge	*I81*	#	*85,105*	*20,745*	*0.97*	*92,675*	*24,690*	*0.53*	*89,785*	*-3.1%*	*20,260*	*-18.0%*	*0.51*
	I64		35,100	7,690	0.40	30,560	4,680	0.35	33,035		8,240		0.38
	US 460		63,250	4,390	1.44	63,640	4,450	1.45	63,540		4,420		1.44
	U220		6,335	960	0.35	4,530	395	0.25	5,195		1,065		0.29
Rockbridge/Augusta	*I81*	#	*99,870*	*24,640*	*1.13*	*120,110*	*29,330*	*0.68*	*118,990*	*-0.9%*	*28,155*	*-4.0%*	*0.68*
	U11		14,985	3,520	0.83	500	5	0.03	580		10		0.06
	Hwy 252		10,635	95	1.33	11,190	90	1.40	11,180		90		1.40
	US 29		20,500	4,600	0.47	19,850	4,170	0.45	20,040		4,630		0.49
	Hwy 42		4,745	115	0.37	3,515	40	0.27	3,520		105		0.27
Augusta/Rockingham	*I81*	#	*92,055*	*24,195*	*1.05*	*107,810*	*27,710*	*0.61*	*105,570*	*-2.1%*	*22,100*	*-20.3%*	*0.60*
	U11		15,605	1,620	0.87	9,780	25	0.54	10,705		3,070		0.59
	Hwy 42		12,610	25	0.97	10,835	10	0.83	11,050		25		0.85
	U340		13,220	290	0.73	13,190	50	0.73	13,375		235		0.74
Rockingham/Shenandoah	*I81*	#	*86,590*	*22,020*	*0.98*	*97,875*	*24,355*	*0.74*	*92,265*	*-5.7%*	*13,885*	*-43.0%*	*0.70*
	U11		18,150	3,850	1.01	12,085	2,355	0.67	17,455		11,235		0.97
	Hwy 42		4,295	10	0.54	3,710	5	0.46	3,605		15		0.45
	U211		20,660	15	0.47	22,395	10	0.51	22,585		20		0.51
	U340		11,750	125	0.65	9,610	110	0.53	9,565		390		0.53
Shenandoah/Frederick	*I81*	#	*88,220*	*15,730*	*1.00*	*100,125*	*17,785*	*0.57*	*97,020*	*-3.1%*	*12,340*	*-30.6%*	*0.55*
	U11		15,445	2,635	0.86	8,040	650	0.45	11,555		5,825		0.64
	Hwy 628		5,105	10	0.64	2,325	0	0.29	2,880		5		0.36
	U522		26,685	60	1.21	27,265	60	1.24					

I81 Virginia Corridor
Toll Diversion Summary

		No Build			6/8 Lane Configuration							
		No Toll			No Toll			Truck Only Toll ($0.04 per mi/axle truck)				
County Line	Facility Name	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	Trucks	V/C Ratio (LOS E)	Tot Veh	% Diversion (Tot Veh)	Trucks	% Diversion (Trucks)	V/C Ratio (LOS E)
Washington/Smyth	*I81*	*62,660*	*18,695*	*0.71*	*64,200*	*19,115*	*0.49*	*63,950*	*-0.4%*	*18,480*	*-3.3%*	*0.48*
	U11	7,210	10	0.40	6,985	10	0.39	6,680		45		0.37
	Hwy 91	17,080	5	1.31	16,955	5	1.30	16,835		5		1.30
Smyth/Wythe	*I81*	*59,090*	*19,030*	*0.67*	*60,140*	*19,445*	*0.46*	*58,615*	*-2.5%*	*17,965*	*-7.6%*	*0.44*
	U11	3,075	0	0.17	3,010	0	0.17	3,970		885		0.22
	Hwy 42	385	0	0.03	380	0	0.03	385		5		0.03
Wythe/Pulaski	*I81*	*80,610*	*20,900*	*0.92*	*94,050*	*26,350*	*0.53*	*91,185*	*-3.0%*	*23,250*	*-11.8%*	*0.52*
	Hwy 42	1,770	5	0.14	1,705	5	0.13	1,710		5		0.13
	U221	12,395	675	0.69	11,345	240	0.63	11,545		470		0.64
Pulaski/Montgomery	*I81*	*80,160*	*22,425*	*0.91*	*91,990*	*26,335*	*0.52*	*89,360*	*-2.9%*	*23,380*	*-11.2%*	*0.51*
	U11	18,075	20	0.50	15,985	15	0.44	16,010		25		0.44
Montgomery/Roanoke	*I81*	*88,485*	*22,620*	*1.01*	*103,180*	*27,880*	*0.59*	*101,300*	*-1.8%*	*24,385*	*-12.5%*	*0.58*
	U11	23,550	1,485	0.65	17,285	0	0.48	17,495		350		0.49
	Hwy 42	2,820	450	0.22	1,580	0	0.12	1,605		0		0.12
Roanoke/Botetourt	*I81*	*95,935*	*21,560*	*1.20*	*119,410*	*28,425*	*0.75*	*117,665*	*-1.5%*	*25,070*	*-11.8%*	*0.74*
	U11	25,810	1,510	0.81	17,085	15	0.53	17,045		280		0.53
	US 460	35,070	1,970	1.10	29,850	180	0.93	31,100		180		0.97
Botetourt/Rockbridge	*I81*	*85,105*	*20,745*	*0.97*	*92,675*	*24,690*	*0.53*	*90,925*	*-1.9%*	*21,490*	*-13.0%*	*0.52*
	I64	35,100	7,690	0.40	30,560	4,680	0.35	32,105		7,325		0.36
	US 460	63,250	4,390	1.44	63,640	4,450	1.45	63,540		4,470		1.44
	U220	6,335	960	0.35	4,530	395	0.25	5,015		895		0.28
Rockbridge/Augusta	*I81*	*99,870*	*24,640*	*1.13*	*120,110*	*29,330*	*0.68*	*119,600*	*-0.4%*	*28,460*	*-3.0%*	*0.68*
	U11	14,985	3,520	0.83	500	5	0.03	0		0		0.00
	Hwy 252	10,635	95	1.33	11,190	90	1.40	11,115		90		1.39
	US 29	20,500	4,600	0.47	19,850	4,170	0.45	21,420		4,490		0.49
	Hwy 42	4,745	115	0.37	3,515	40	0.27	3,555		100		0.27
Augusta/Rockingham	*I81*	*92,055*	*24,195*	*1.05*	*107,810*	*27,710*	*0.61*	*106,745*	*-1.0%*	*25,670*	*-7.4%*	*0.61*
	U11	15,605	1,620	0.87	9,780	25	0.54	9,840		195		0.55
	Hwy 42	12,610	25	0.97	10,835	10	0.83	10,810		20		0.83
	U340	13,220	290	0.73	13,190	50	0.73	13,445		245		0.75
Rockingham/Shenandoah	*I81*	*86,590*	*22,020*	*0.98*	*97,875*	*24,355*	*0.74*	*94,200*	*-3.8%*	*16,735*	*-31.3%*	*0.71*
	U11	18,150	3,850	1.01	12,085	2,355	0.67	15,105		8,850		0.84
	Hwy 42	4,295	10	0.54	3,710	5	0.46	3,655		10		0.46
	U211	20,660	15	0.47	22,395	10	0.51	22,210		15		0.50
	U340	11,750	125	0.65	9,610	110	0.53	9,630		360		0.53
Shenandoah/Frederick	*I81*	*88,220*	*15,730*	*1.00*	*100,125*	*17,785*	*0.57*	*98,410*	*-1.7%*	*15,250*	*-14.2%*	*0.56*
	U11	15,445	2,635	0.86	8,040	650	0.45	9,645		2,880		0.54
	Hwy 628	5,105	10	0.64	2,325	0	0.29	2,775		5		0.35
	U522	26,685	60	1.21	27,265	60	1.24	26,995		60		1.23

I81 Virginia Corridor
Toll Diversion Summary

		Change in Total Vehicles				Change in Total Number of Trucks					
		% Change in Total Number of Vehicles		**% Increase/ Decrease in Total Vehicle Diversion**		% Change in Total Number of Trucks		**% Increase/Decrease in Total Trucks Diversion**		% Increase/Decrease in V/C Ratio	
County Line	Facility Name	High Toll vs. Truck Only Low Toll	Low Toll vs. Truck Only Low Toll	**High Toll vs. Truck Only Low Toll**	**Low Toll vs. Truck Only Low Toll**	High Toll vs. Truck Only Low Toll	Low Toll vs. Truck Only Low Toll	**High Toll vs. Truck Only Low Toll**	**Low Toll vs. Truck Only Low Toll**	High Toll vs. Truck Only Low Toll	Low Toll vs. Truck Only Low Toll
Washington/Smyth	*I81*	29%	14%	**-22%**	**-12%**	10%	0%	**-9%**	**0%**	29%	14%
	U11	-54%	-47%			-96%	29%			-39%	-47%
	Hwy 91	-5%	-2%			0%	0%			-64%	-2%
Smyth/Wythe	*I81*	44%	17%	**-30%**	**-14%**	5%	-5%	**-4%**	**5%**	57%	17%
	U11	-75%	-64%			-33%	17600%			-44%	-64%
	Hwy 42	-75%	-40%			-97%	0%			305%	-41%
Wythe/Pulaski	*I81*	18%	4%	**-15%**	**-4%**	-4%	-8%	**4%**	**8%**	10%	4%
	Hwy 42	-15%	-4%			0%	0%			215%	-4%
	U221	-11%	-4%			4%	21%			-33%	-4%
Pulaski/Montgomery	*I81*	17%	6%	**-14%**	**-6%**	-4%	-8%	**4%**	**8%**	12%	6%
	U11	-19%	-8%			150%	150%			-12%	-8%
Montgomery/Roanoke	*I81*	12%	3%	**-11%**	**-3%**	-4%	-8%	**3%**	**7%**	-5%	3%
	U11	-24%	-5%			-78%	25%			-24%	-5%
	Hwy 42	-37%	-21%			-100%	-100%			146%	-21%
Roanoke/Botetourt	*I81*	11%	6%	**-10%**	**-6%**	-9%	-8%	**8%**	**8%**	-27%	6%
	U11	-22%	-17%			2700%	1300%			-29%	-17%
	US 460	-5%	0%			38%	-18%			-53%	-1%
Botetourt/Rockbridge	*I81*	10%	3%	**-9%**	**-3%**	-7%	-8%	**7%**	**8%**	3%	3%
	I64	-12%	-4%			30%	27%			16%	-4%
	US 460	-2%	0%			2%	2%			-67%	0%
	U220	-22%	-15%			13%	92%			35%	-15%
Rockbridge/Augusta	*I81*	15%	5%	**-13%**	**-4%**	1%	-1%	**-1%**	**1%**	-18%	5%
	U11	-100%	-100%			-100%	-100%			-16%	-100%
	Hwy 252	1%	2%			-14%	-10%			-65%	2%
	US 29	-7%	-3%			-6%	-2%			-7%	-2%
	Hwy 42	-22%	-10%			67%	100%			39%	-10%
Augusta/Rockingham	*I81*	15%	11%	**-13%**	**-10%**	3%	-4%	**-3%**	**4%**	-8%	11%
	U11	-35%	-33%			-88%	333%			-43%	-33%
	Hwy 42	-15%	-11%			33%	0%			-50%	-11%
	U340	1%	-3%			14%	113%			-34%	-3%
Rockingham/Shenandoah	*I81*	12%	6%	**-10%**	**-6%**	-33%	-30%	**33%**	**29%**	-24%	6%
	U11	-23%	-13%			450%	298%			-56%	-13%
	Hwy 42	-30%	-29%			-33%	0%			-25%	-29%
	U211	16%	17%			-25%	0%			11%	17%
	U340	-22%	-13%			76%	26%			-29%	-13%
Shenandoah/Frederick	*I81*	21%	11%	**-17%**	**-10%**	-7%	-11%	**7%**	**11%**	5%	11%
	U11	-37%	-17%			56%	140%			-43%	-17%
	Hwy 628	-27%	-22%			0%	0%			2%	-22%
	U522	4%	-1%			0%	-8%			-59%	-1%
Percent increase/ decrease in Vehicle Diversion	**Hi**			**-30%**	**-14%**			**33%**	**29%**		
	Low			**-9%**	**-3%**			**-9%**	**1%**		
	Median			**-13%**	**-6%**			**4%**	**8%**		

I81 Virginia Corridor
Toll Diversion Summary

		Change in Total Vehicles				Change in Total Number of Trucks					
		% Change in Total Number of Vehicles		**% Increase/ Decrease in Total Vehicle Diversion**		% Change in Total Number of Trucks		**% Increase/Decrease in Total Trucks Diversion**		% Increase/Decrease in V/C Ratio	
County Line	Facility Name	High Toll vs. Truck Only High Toll	Low Toll vs. Truck Only High Toll	**High Toll vs. Truck Only High Toll**	**Low Toll vs. Truck Only High Toll**	High Toll vs. Truck Only High Toll	Low Toll vs. Truck Only High Toll	**High Toll vs. Truck Only High Toll**	**Low Toll vs. Truck Only High Toll**	High Toll vs. Truck Only High Toll	Low Toll vs. Truck Only High Toll
Washington/Smyth	*I81*	18%	5%	**-14%**	**-4%**	-24%	-31%	**21%**	**30%**	18%	5%
	U11	-29%	-18%			226%	11871%			-44%	-18%
	Hwy 91	-4%	-2%			0%	0%			-67%	-2%
Smyth/Wythe	*I81*	30%	6%	**-20%**	**-5%**	-34%	-40%	**30%**	**39%**	44%	6%
	U11	-45%	-22%			356%	119700%			-49%	-22%
	Hwy 42	-75%	-40%			-97%	0%			272%	-41%
Wythe/Pulaski	*I81*	16%	2%	**-13%**	**-2%**	-14%	-18%	**13%**	**17%**	1%	2%
	Hwy 42	-15%	-4%			0%	0%			189%	-4%
	U221	-8%	-1%			66%	91%			-38%	-1%
Pulaski/Montgomery	*I81*	15%	4%	**-12%**	**-4%**	-13%	-17%	**12%**	**16%**	3%	4%
	U11	-19%	-7%			200%	200%			-19%	-7%
Montgomery/Roanoke	*I81*	10%	1%	**-8%**	**-1%**	-18%	-22%	**16%**	**21%**	-13%	1%
	U11	-16%	5%			88%	945%			-30%	5%
	Hwy 42	-27%	-7%			60%	167%			126%	-7%
Roanoke/Botetourt	*I81*	9%	4%	**-8%**	**-4%**	-17%	-16%	**17%**	**16%**	-33%	4%
	U11	-18%	-13%			13900%	6900%			-34%	-13%
	US 460	-9%	-4%			269%	118%			-57%	-1%
Botetourt/Rockbridge	*I81*	9%	2%	**-8%**	**-2%**	-12%	-14%	**12%**	**13%**	-5%	2%
	I64	-10%	-1%			46%	43%			7%	-1%
	US 460	-2%	0%			0%	0%			-70%	0%
	U220	-19%	-12%			35%	129%			24%	-12%
Rockbridge/Augusta	*I81*	14%	4%	**-13%**	**-4%**	0%	-2%	**0%**	**2%**	-25%	4%
	U11	-94%	-72%			0%	100%			-23%	-43%
	Hwy 252	1%	2%			-14%	-10%			-68%	2%
	US 29	-13%	-10%			-3%	1%			-14%	-2%
	Hwy 42	-22%	-10%			75%	110%			28%	-10%
Augusta/Rockingham	*I81*	13%	10%	**-12%**	**-9%**	-11%	-17%	**10%**	**17%**	-16%	10%
	U11	-30%	-27%			91%	6722%			-47%	-27%
	Hwy 42	-13%	-9%			67%	25%			-54%	-9%
	U340	1%	-4%			9%	104%			-40%	-4%
Rockingham/Shenandoah	*I81*	9%	4%	**-8%**	**-4%**	-44%	-42%	**45%**	**41%**	-30%	4%
	U11	-11%	1%			598%	405%			-59%	1%
	Hwy 42	-30%	-30%			0%	50%			-31%	-30%
	U211	18%	19%			0%	33%			2%	19%
	U340	-22%	-14%			90%	37%			-35%	-14%
Shenandoah/Frederick	*I81*	20%	9%	**-16%**	**-8%**	-25%	-28%	**23%**	**27%**	-3%	9%
	U11	-25%	-1%			215%	385%			-48%	-1%
	Hwy 628	-24%	-19%			0%	0%			-6%	-19%
	U522	-100%	-100%			-100%	-100%			-62%	-100%
Percent increase/ decrease in Vehicle Diversion	**Hi**			**-20%**	**-9%**			**45%**	**41%**		
	Low			**-8%**	**-1%**			**0%**	**2%**		
	Median			**-12%**	**-4%**			**16%**	**17%**		